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Bristol.

THE appearance of the second of this series of volumes has been speedily followed by the third.* As in the second we had the work of Dr. Freeman, one of the editors, so in this volume we have the authorship of the other editor. Both works have, therefore, additional interest, since in them the editors having the care of the series set before us some of their own views of the aims and objects of the whole.

Each of the cities or towns whose histories will be related, as we have already seen in our notice of the City of London,† are chosen as having special features different from those of others. On this account, Bristol has been selected, and selected with judgment, out of some others, since it owes its place in our national history from its having been the greatest purely trading town in a country that owes its greatness to its trade. It was second only to London for many centuries. Bristol history is different from that of London in an important essential. We are told that its history does not begin until a period that seems almost modern. The first fact that can be referred to does not take us further back than about the year 1000. This fact is one which we owe to the science of numismatics. It is, in reality, the existence of a silver penny of that king of Saxon England with the inglorious name of Ethelred the Unready, struck at Bristol.

We have, therefore, this as a starting-point, that at the period indicated the town had risen to be of sufficient importance to boast the existence of a Royal Mint in its midst. Of its earlier history there appears to be no record. There are, however, some indications to be derived from its position, its name, and some other circumstances which merit attention. Their consideration will, we think, furnish sufficient evidence to warrant the belief that the site of Bristol must have been occupied for many ages; and they might have been dwelt upon with advantage in the pages before us. Its position seems mapped out for the site of a town. Standing on the banks of a wide river, the Avon, whose British name has survived to our own day, as have also those of so many other rivers, it is surrounded on two other sides irregularly by the Frome, the approach being from the east by a tongue of somewhat elevated land between the two rivers. Roughly speaking, this, the original form of the town, is nearly the plan of the British and Romano-British town of Exeter* over again, while the similarity is still greater, from the position of the castle and the crossing of the main streets in the centre of the town at a carfax. In Bristol the course of the city walls is more curved to follow the irregularities of the site than at Exeter, and the main road does not pass in at the east and out again at the west. Although there is a western road it led only to the marsh; the main road turns at right angles at the carfax and goes over the Frome to the north. Speaking, therefore, from the analogy of the plan, we are inclined to believe that Bristol occupies a very ancient site. The name points in the same direction, for we are told that it appears in its earliest form as "Bricgston," or fenced place at the bridge. This name is, doubtless, older than the formation of the Mint, and it gives us one more indication of the beginnings of the town. Other circumstances also help our inquiry, which may be briefly noted. Mr. Karslake has shown us that the name of the British Saint Ewen appears in the dedication of one of the churches in the centre of the town. The name of another, St. Brendan, is associated with a high hill near the town. Another of the churches, as at Exeter, is called after the early Saxon Mercian St. Werburgh. There is again, here, as at Exeter, and in so many others of our most ancient towns, a remarkable group of churches close together, in what must in all probability have been the portion of the town which was occupied the earliest, while they are further apart in those portions that are known to be of the latest formation. When we come to inquire for the records of the foundation of these buildings, however, we find nothing. Lastly, although the Castle of Bristol, strong as was its building, and extensive as was its site, is so completely swept away that only very few traces of its existence remain above ground, yet there are historical evidences that ought to make us pause before we assent to the popular belief that it had no existence until founded in Norman times. It appears that there is no historical record of such pre-existence known. There is, however, evidence that it had a lofty earthen mound. The existence of this peculiar feature in our ancient castles has received much attention of late years, and research has rendered it more than probable that these mounds are the remains of the defensive works of Saxon date, afterwards used by the Normans. Some few years ago there were notices in more than one public journal of the discovery of a series of subterranean passages, which were then supposed to extend to a great distance beneath the town. We have turned with interest to the volume before us in the hope that some critical notice would have been rendered as to the importance or otherwise of the discovery, since it might have some bearing upon the interesting subject of the antiquity of the town. We are sorry that there is no notice whatever of the subject, either to disprove or to attach importance to it.

Be the antiquity of Bristol, however, ever so great, as we believe it to be, this in no way militates against the choice of the history of the town for the purpose of rendering a record of how trade, and trade alone, has caused the place to rise from obscurity to the position of one of the most important towns in the kingdom. This aim our author keeps steadily before him, and his task is evidently a congenial one. To ourselves it is matter for some regret; for the history of a place which has been developed by trade, and whose records are of bold mercantile effort and voyages to distant regions, does not of necessity render so many indications having relation to architectural art as the readers of our journal may care for. On this account, we propose to ourselves to briefly run over such points of the history as may be of interest to every one, to dwell upon the rise and progress of the governing powers, to linger longer upon what evidences there are of the buildings upon which the merchant princes spent some of the money which they had acquired by their adventures and success in trade, and lastly to follow our author in his happy idea of devoting a whole chapter to "odds and ends."

The work is illustrated by four maps, one showing the town as it is presumed to have been about 1066. Another shows the growth made in two hundred years, which certainly appear to have been years of rapid development, for not only was a new channel dug between the town and St. Augustine's, for the purposes of mercantile traffic, but the large area of Temple was occupied, extending from Bristol Bridge close up to the north side of Redcliff Church, and defended by wall and ditch. The third plan shows the town, in 1480, as known to William of Worcester. Rockhyth, which is shown as having been enclosed at the period of the former map, appears as defended by a strong wall and towers in the third map, which also indicates the development of an extension eastward, beyond the Castle shown in the former plan, the latter space alone being very nearly double in extent the area of the older part of the town. These maps, together with the fourth, which shows the lines of fortification drawn

* Historic Towns. Edited by E. A. Freeman and W. Hunt. London: Longmans, Green, & Co. 1887.
† See *Builder*, Jan. 1st, p. 1.

* See *Builder*, p. 337, *ante*.

around the city during the troubles of the Civil Wars, render very graphic evidence of the growth and increase of the city. They have been prepared by Mr. A. S. Ellis, not from ancient plans, but from historical evidences. A comparison of them affords interesting evidence with respect to the curious grouping of the churches, to which we have already referred. We have ventured to believe that those in the older portion of the town are of ancient foundation, and in this respect they agree with what we have already spoken of in our notices of similar groups in London and Exeter. Here at Bristol their early foundation seems supported by additional evidence of another kind, and it is this: whatever circumstances may have occurred to cause the erection of a number of churches so close together that there were actually three fronting one another at three of the four corners of the carfax, and several others within almost a stone's throw, yet these circumstances did not exist in so marked a degree when extension was made to the area of the town.

The added districts are vastly larger than that which is shown in the map of Bristol, *circa* 1066, and, as we have seen, these additions were made mostly before 1250.

If we turn, however, to the map dated about 1480, where all the churches are marked, we shall find that the period from about 1066 to the latter date, which is supposed to have been a church-building age, seems to have done little for the largely-increased area by the foundation of parishes within them. The eastern district has only a single parish church, St. Philip, while the larger area of Temple has only St. Thomas à Becket, now known as St. Thomas the Apostle, a dedication which sufficiently shows the period of its foundation; and Temple Church, which only grew into a parish church out of the establishment of the Knights Templars on the suppression of that order.

The district around St. Augustine's, Billeswick, has the parish church of St. Augustine-the-Less, the monks of the future cathedral "being unwilling to allow their tenants, whose houses were now probably lying thickly about the precints, to use their church." As a set off to this, the priory church of St. James appears to have been an example of a class of buildings of rather rare occurrence, although not so unfrequent as was supposed a few years since, of a double church, the western portion of which is still in existence, being parochial. These instructive maps show us other interesting phases of the means adopted in the middle ages of supplying buildings for worship, and we can trace in them how the system varied at different periods. The more recently settled district between the old course of the Frome, which ran round the town wall and the Red Causeway, originally part of Avon Marsh, has but one parish church, St. Stephen's, but there were several chapelries, while there were a goodly number of these smaller buildings scattered about, including one on the bridge; but the mode of forming new parishes appears nearly to have passed away. The various orders of Friars had their establishments in various positions as their orders grew into being, and there are no less than four examples of churches erected upon the city walls, over or beside the entrance gates.

The history of Bristol is well told, and it will be read with interest by more than residents only, for it is an interesting page of the general narrative of the progress of our country. Indeed, it will be apparent to the readers of the volume before us that the events which have occurred within the walls of the town have been of extreme importance. This may be equally true of every town of our historic country, in greater or less degree; and we cannot but think that the investigation of the part played in the general history of our land by each of its towns may prove to be one of the most fascinating and useful of studies.

The Norman invasion inflicted no injury on Bristol, and the town and its trade continued to flourish all through the troublous times which followed it. Robert Fitz-Hamon, who was made Earl of Gloucester in 1119, appears to have rebuilt the strong castle erected, it is supposed, by Bishop Geoffrey of Coutances. At any rate, he raised a square keep, the largest in the kingdom, except the keeps of Colchester and the Tower of London, and the building played no unimportant part in the town's history until its demolition shortly after the Civil Wars. Its site is now so completely built upon that only the fragments we have already alluded to are to be traced.

There are many interesting details recorded of the existence from an early period, and of the rise and progress, of the trading communities, with notices of their resistance to the power of the local nobles. We hear of these from the beginning, and of their acquisition of rights and privileges which were confirmed by successive charters,—the rights here, as elsewhere, appearing to have had the prior existence, and to be only recognised or regulated by the charters, instead of being created by them. In Bristol, too, we find how completely, from an early period, the burgesses were able to hold their own against all local lords; and in our author's chapter on the Great Insurrection, as it is styled, their contentions with the Lords of Berkeley, and their resistance to the Earl of Gloucester, who came against the city with 20,000 men, indicate that a different spirit animated the fathers of our towns to that which is apparent in the history of many a trading community on the Continent, where the feudal lords became paramount. The contrast between the history of most of our English towns and those of the Continent is not a little remarkable in this respect, and it indicates that a far greater amount of personal freedom was enjoyed by the burgesses within the shelter of their walls than was the case out of England.

In the famous parley between Aylmer de Valence and the chiefs of the defiant town in 1316, we find the following reply rendered by them:—"Certain men tried to deprive us of our rights, and we defended them, as reason was we should. If, therefore, the king will take off the burdens he has laid upon us, and will grant us life and limb, chattels and tenements, then he shall be our lord and we will do his will; if not, we will go on as we have begun, and will defend our liberties and privileges even to the death." The temper which animated the utterance of such words was not slow to support them with corresponding deeds, and the liberty of the people was in safe keeping.

At Bristol we find the Reeve of Saxon times collecting the revenues, and we are told of the relation of the town to the manor of Barton. In the charters we can trace the creation of the office of Mayor, with his council, and of the right of choice exercised by the burgesses, although this may soon have become more nominal than real. In addition to this, there is evidence of the gradual loss of the popular vote until the selection of the aldermen became in fact lost to the townsmen, the corporation being self-elected and the government of the town a local oligarchy of capitalists who had it all their own way, although they appear to have had the happy manner of avoiding collision with what was a formidable power for mischief, a Bristol mob. "The change was gradual; it grew up during the fifteenth century, though it was not recognised by charter until the reign of Charles II." The history of this charter, and of its being granted just at the close of the reign of Charles II., is told elsewhere in the pages before us. When the old spirit of independence was dormant, Bristol, as well as other towns, had to surrender their old charters by an arbitrary and illegal act of the king's.

Bristol, owing, as it did and does, its existence and its wealth so entirely to its trading pursuits, might be expected to afford in its history, as recorded in the volume before us, interesting records of those important factors in Mediæval life, the trading and religious guilds, and we are not disappointed. The charter of John, while Count of Mortain, granted probably in 1188, fully recognises the existence of these associations, and at an anterior date. It runs thus: "They may have all their reasonable guilds as well or better than they had them in the time of Robert and his son William, Earls of Gloucester." We may briefly give the following summary of the nature of these guilds. They all had more or less of a religious character. They acted somewhat like the benefit clubs and mutual insurance societies of our own time; each had its patron saint. A common feast and much drinking together were common features. They existed for special objects, in some the religious element being uppermost. The Guild of Kalendars undertook, in addition to other works, those of education and learning; the name, not uncommon, being derived, it is supposed, from the meetings being on the kalends of each month. Women as well as men were members of the various guilds. Our author objects to the generally-received title of craft-guild, as applied to those societies which were associated with specific trades, for the terms "craft" and "guild" express two distinct ideas. He says:—"A craft or mystery was a particular trade carried on by men who had a knowledge of it; a guild was a means of association based on certain acts of religion and mutual help performed at the common cost." This may be well enough, but surely it is hardly supported by our author's statement which follows on,—"the money necessary for these and for all other acts of the society being raised by a rate or *gyld* levied on each of the members." Surely this definition would apply equally to whatever was the nature of the work which the society had to do, and we cannot but think that the generally received name of craft-guilds is a very good one. The trades or crafts took common action to protect their common interests, whether from the burgher aristocracy, to shut out external competition, or the like. Our author is on more certain ground when he speaks of the trading associations having more of a corporate existence than those bodies, we think more or less cognate, which were of a more voluntary nature. Still, we can but consider that all such communities had their beginnings in voluntary combinations, and that as they grew in wealth and importance they would seek for incorporation, which they would obtain for payment or otherwise. We are speaking of Mediæval times, but these remarks may perhaps equally apply to the growth of earlier societies in Roman times.

No one might exercise his trade unless he belonged to its guild. The guilds had their own halls. Many had their own chapels, and the Kalendars had a free library. Their mass priests were often turned to good account, we suppose, to fill up their time by teaching or such matters. Indeed, the records of some guilds as to the employment of their priest are not a little curious in evidence of the shrewd bargains sometimes made by our ancestors. Our author does not think that there is reason for belief that the guilds had any connexion with the government of Bristol before the end of the twelfth century, although, he says, there can be no doubt that these institutions existed before the Conquest. So far as one of the guilds, at least, is concerned, our author's own evidence appears to point the other way; for he shows that the important function of choosing the mayor and his assistants was exercised by the most important guild of the town,—that of the merchants. If he means that when there was no popular Government in existence, there could be no guild connected with it, then this is obvious enough. But since we find the election of mayor thus exercised, it appears evident that some sort of government did previously exist before mayors are heard of, and that it was exercised by the principal body, the recognition of government being acquired by it but as a continuance of its already existent powers. The earliest reliable charters are addressed to the burgesses, and this alone is sufficient to show that some sort of associated body of men was already in being. In some cases elsewhere, which are named, the municipal privileges were conferred on the merchant guild, by the terms of a charter, and in these cases there is direct evidence of the governing character of the guild, and also, it must be added, of its prior existence.

The objection taken to the name of craft-guilds is supported by evidence that while all the guilds were suppressed in the time of Edward VI., yet the crafts continued to exist as incorporated societies. May it not rather be that the parts of such societies which were devoted to superstitious usages were suppressed, leaving the remainder intact? The societies which were thus mostly concerned with the finding of money for masses or the like ceased to exist, while the others remained. In London we find much evidence of the suppression of the obits and chantries founded by the various trading or craft guilds, which societies, however, continued to exist notwithstanding.

The various crafts at Bristol, which were inguilded to the number of twenty-six, as in other towns exercised their callings each in its own district. Thus the weavers were established in Temple fee; their guild chapel, dedicated in 1299, still stands against Temple Church. The tuckers or fullers were in Tucker-street, the butchers in Bocherew, the cooks in Cooks-row. The bakers had their hall adjoining the Dominican Priory. The names of the patron saints of several of the guilds have been recorded, and they are curious. Thus, the tailors called upon St. John the Baptist, the bakers St. Clement, the weavers St. Katharine, while the merchant guild appears to have had St. Clement and St. George.

The merchants of Bristol engaged largely in church-building and other like good works. William Canynges the elder, as is so well known, rebuilt a great part of St. Mary Redcliff. John Shipward built the fine tower of St. Stephen's, while the almost equally fine tower of St. Werburgh's appears to have been built at about the same time. The removal of this beautiful monument is not mentioned, nor is any passing remark made as to its re-erection elsewhere.

The recent removal of a great number of the old timber houses of the city, which gave so characteristic an appearance to the older streets, is also unrecorded. But then the volume before us has many passing allusions to matters less architectural, although of no little public interest. Passing onward in our hasty sketch of this volume, we may say that it is replete with references to old-world customs and past events, some of momentous interest, as are those relating to the discovery of America, the planting of New England, and the siege of Bristol in the Civil Wars. Some are but of local interest, as are those of the private warfare of the nobles, the tossing of dogs and cats on Shrove Tuesday, the whipping of thieves, the use of the pillory and ducking-stools; this latter machine of punishment having been used for the last time in 1718. The Mayor's presence at duck-hunting and at the preaching of the boy bishops, the performance of Bristol mysteries,—all come in for passing mention. The continuance of trade, and its fluctuations, are ably treated, well-deserved censure being meted out to the traffic which existed in slaves in early as well as in recent times,—meriting condemnation even by the not too nice Judge Jeffreys in 1685. The soap, the woollen trade, the success of privateers fitted out by Bristol merchants, the building of ships,—all these are mentioned; as are also some of the great merchants, such as Canynges in early times, and Colston in later ones, while the use of sledges for the transit of merchandise is noted. The foundation of the cathedral on the suppression of the monastery is only briefly alluded to, but it appears that the old nave and aisles had been removed for rebuilding prior to the latter event, a work only recently accomplished, and not altogether unlike the contemplated design which has been preserved to us.

We have now said enough to show that the volume before us is of no little interest, and that it forms a worthy addition to the volumes which have preceded it, and we may conclude with two brief extracts:—"Looking back on the history of Bristol, as a whole, we can see that, while the career of a trading town during the Middle Ages was marked by attempts at isolation and was fostered by exclusive privileges the national life of England has happily been strong enough to make the prosperity of such a town part of the general welfare of the country, and that in tracing its fortunes we have been reading an important chapter in the history of the English people." "While the wiser of her citizens do not look forward to a future in which she will outstrip cities and towns which, though some of them in comparison with her are but of yesterday's growth, have now left her far behind, they have reason for their confident expectation that the commerce of their ancient city will continue to grow and flourish, and that she has a career before her not wholly unworthy of her glorious past."

ON THE THEORY OF THE ABANDONMENT OF ANCIENT LIGHTS.*

BY GEO. H. POWELL, BARRISTER-AT-LAW.

FROM these examples it surely follows that if "to abandon" means to cease to use, then the above principle, which requires the position of the new window "substantially to coincide" with that of the old one, is based on a fiction, and that the application of it must constantly produce absurd and (it is submitted) unjust results. Yet it will be observed that learned judges continue to apply it, while, almost in the same breath defining the prescriptive right as a right to a certain "cone"† of light, or to the enjoyment of certain specific pencils of light, the access of which has been enjoyed for the requisite number of years. But these pencils of light must come from some part of the sky area, and in so far as they come from a portion of the sky area not intercepted by the new aperture, in so far the new aperture does not enjoy the same light, is not "lighted in the same manner," and finally does not "correspond" (in any sense relating to light) to the aperture of the original window. To refer once more to fig. 3, which we reprint for the convenience of our readers. Surely nothing could be clearer than that *c d* (and not *e f*) is the aperture in the new wall which corresponds, so far as is possible (in respect of the light intercepted by each), to *a b* in the old wall. If the plaintiff's light were derived from an area equal and exactly opposite to *a b* on the surface of the wall of the servient tenement, then and then only could the aperture *e f* be said to "correspond" (in the above-mentioned sense) to the aperture *a b*; for in that case, and in that case only, would identity in position involve identity (so to speak) of light.‡

Now, without denying that a principle based on a fiction (legal or otherwise) may sometimes be practically useful, is it not possible here to apply one which is based upon facts, and which would yet afford a sufficiently clear test of the rights attached to the dominant and servient tenements respectively?

The result of the above considerations is this, that a prescriptive right to light having been acquired in respect of the aperture *a b*, over the obscuring horizon at *g*, the owner of the servient tenement is restricted in the exercise of his *primâ facie* right to build as he pleases by two lines of limitation shown in fig. 4.

(1.) Below the level of the obscuring horizon *g*, he cannot advance his building (supposing him to have on other grounds the right to advance it) beyond the line *g b*,—*g b* representing one side of the sectional volume of light,§ *g b p*, illuminating the window, *a b*.

(2.) Above the level of the obscuring horizon, *g*, he cannot raise his building (supposing him to have on other grounds the right to retire it, and to raise it) above the line *g a′*, —*g a′* representing (in section) one side of the inverted pyramid shown in fig. 1 A, whose base represents the intercepted area of sky. He can, for instance, advance his building below the present horizon *g* (fig. 4) to the point *n*. He can raise it above the horizon *g* to the

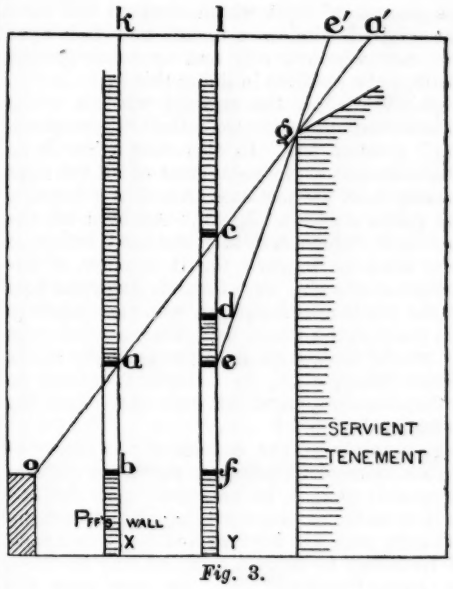

Fig. 3.

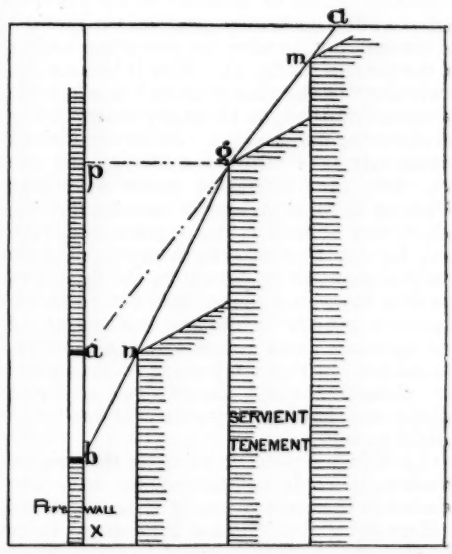

Fig. 4.

point *m*. But he can do no more than this. And the positions of the lines of limitation *g a′* and *g b* are (it is needless to observe) always easily determined, depending, as they do, on the angles which *g a*, *g b* (straight lines drawn from the obscuring horizon to the top and bottom of the window respectively) make with the straight line *a b*.

The above being the restrictions imposed on the defendant in the enjoyment of his property, it only remains to add that (assigning but its ordinary common-sense meaning to the term "abandonment") whenever the plaintiff so changes the position of his window that it becomes possible for the defendant to advance or to raise his building beyond either of the aforesaid lines of limitation without interfering with the enjoyment by the plaintiff of whatever of his original prescriptive rights he still continues to enjoy, the defendant can so advance or raise his building with impunity.

Now to return to the questions originally propounded, and to answer them on the principles above laid down.

(1.) When for the original window *a b* is substituted* a window at *c d* (fig. 3). Here there is no abandonment, since whether we consider the prescriptive right to be a right to

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* Continued from p. 530, *ante*.

† See remarks of Bowen, L.J., referred to above, and *passim*.

‡ It will be observed (fig. 3) that the aperture *c d* is smaller than the aperture *a b*. If it were not so, *c d* would, of course, intercept a *larger* area of sky than was intercepted by the original aperture, *a b*. But this would confer on the plaintiff an advantage which he would have no right to retain, and of which the defendant could at any moment, before a fresh period of prescription had elapsed, deprive him. In practice, the plaintiff would often take his chance (since the decision in Tapling *v.* Jones, q.v. *ante*) of acquiring a new right. We are here considering only the continued enjoyment of his old rights unimpaired.

§ Shown as applied to a horizontal skylight, in fig. 1 B.

* In this and the following examples, the original window is, of course, assumed to have been blocked up when the new light is opened.

the enjoyment of certain specific pencils* of light, or a right to intercept (in the manner shown in fig. 1 A) a certain area of sky, the plaintiff is in either case, so far as is compatible with the change in the plane of his wall, in the same position as he was before.

The defendant's rights are similarly unaltered. He is still entitled to advance his building to any point on the line $g\,b$, or to raise it to any point on the line $g\,a'$. He cannot do more than this without obstructing the passage of light which used to fall upon the original window $a\,b$, and now falls upon the new window, $c\,d$; and on what ground could he be justified in doing this?

(2.) When for the original window $a\,b$ is substituted one in the (so-called) "corresponding" position $e\,f$. In this case there is an abandonment of the enjoyment of all the light coming from the sectional area of sky between the points e' and a' (fig. 3). At least all the said light (which certainly was used before) is now used no longer; for it is clear, if the sectional area $e'\,a'$ were the only luminous part of the whole area $k\,a'$, that, while a window in the position $a\,b$ would be lighted, a window at $e\,f$ would receive no light from the sky at all. There being, then, to a certain extent, an "abandonment," how far does this affect the defendant's rights?

It is surely of the essence of the theory of "abandonment" that these rights (in the case supposed) should be enlarged in so far and only in so far as those of the plaintiff are, by his acts, shown to be "waived." *Primâ facie* if he ceases to enjoy a right he may be taken to have "waived" it. In any case the defendant cannot be deprived of his previous right to build up to any point on the line $g\,b$, as, for instance, to raise an obscuring horizon at the point n (in fig. 4). Now it is clear that a window "in the same position" as $a\,b$ (in the advanced wall) might be totally obstructed by an obscuring horizon at n. So far the plaintiff would only have incurred a loss by his own act, but the defendant gains something. Whereas he could previously raise his building (above the horizon g) to any point on the line $g\,a'$, he can now raise it to any point in the line $g\,e'$, since, as we have seen, the light from the area between e' and a' does not reach the plaintiff's window in its new position at $e\,f$, and there can be no reason why the defendant should not obstruct the passage of that which the plaintiff, through his own act, no longer enjoys, and for that very reason has no longer a right to enjoy.

(3.) When supposing $e\,f$ to be the original window, there is substituted for it a new window in the same plane, in the position $c\,d$.

Here the original "line of limitation," below the obscuring horizon g, would be a line drawn from f to g.† But since the plaintiff has, by the substitution of his new window, $c\,d$, for the old window, $e\,f$, relinquished the enjoyment of all light passing below an imaginary line $g\,d$, there has, therefore, been an "abandonment," *pro tanto*, an "abandonment" of something affecting the defendant's rights. The latter may now advance his building to any point on the line $g\,d$. But he cannot do more than this without obstructing the passage of light which the plaintiff enjoyed before and is still enjoying.

But the same, or rather a larger area of sky, is intercepted by $c\,d$ than was intercepted by $e\,f$. But this, as has been already explained, cannot impose auy further restriction on the defendant. He has still the right to raise the servient tenement (above the horizon g) to any point on the line $g\,e'$.

(4.) Still supposing $e\,f$ to be the original window, for which a new one (in another plane) is substituted in the position $a\,b$. In this case the line of limitation below the obscuring horizon g will be advanced to $g\,b$, for similar reasons to those given in the last case, and (also as in the last case) the defendant may still raise his building (above the obscuring horizon) to any point on the line $g\,e'$.

(5.) Lastly, supposing $c\,d$ to be the original window, and a window in the same plane in the position $e\,f$ to be substituted for it. Here there is indeed a practical abandonment. It only remains (as in the said case, *ante*) for the defendant to take advantage of this. The plaintiff has moved his window into a position where the acquired line of limitation, $d\,g$, is of no use to him, since the defendant, by raising his building, as he had always a right to do, to a point on the line $d\,g$, might totally obstruct the new window at $e\,f$.

This case, therefore, requires no further consideration. The plaintiff has, so to speak, advanced into the defendant's territory, and if he loses by this step has clearly only himself to blame.

It will be seen that of the above five propositions the greater part are directly contrary to the law as at present applied. Yet they all result from the consistent application of a perfectly simple principle, which, moreover, finds a considerable amount of support (implied if not express) in many judicial expositions of the law of ancient lights. The inconsistency (as it is submitted to be) in these expositions, taken as a whole, which suggests the adoption of such a principle, may be shortly summarised as follows:—

It is unquestioned that, according to existing law, when the plane of a wall is advanced or retired the prescriptive right existing in favour of a window in the old wall is held to be retained in favour (only) of a window in the new wall, substantially "in the same position" as the original window.

But when we inquire why this is so, the answers are various, though all equally unsatisfactory.

In one place we are told that it is because the two windows are lighted "in the same manner." But any meaning which can be assigned to this rather loose expression involves an untruth, since both the total amount of light received* and its angle of incidence are in each case different. In another place what is perhaps the same idea is expressed in more definite language. The new window, we are told, enjoys the same "cone of light" and receives "the same pencils of light." This explanation is even more openly repugnant to common sense and common observation. "The same pencils of light" (assuming the obscuring horizon to be above the level of the window), unless they follow a zig-zag course like that of a flash of lightning, could by no possibility reach the two windows, and the "cones of light" in the two cases are not even similar cones. Therefore, if the object really desired is that the new window should be lighted in a similar manner, or in as nearly the same manner as possible (in respect of pencils, cones of light, and intercepted area of sky), as the original window, then to put the new window "in the same position" relatively to the wall as the old one, is to go out of our way to avoid the attainment of that result.

In fact, if the prescriptive right be a right to the enjoyment of light (as it is universally described) and not a right to the enjoyment of a window in a certain position, the present law, under the pretence of preserving the exercise of that right, in fact insists on its abandonment. The owner of the dominant tenement is constantly held to have abandoned that which he still continues to enjoy, and as often to have preserved his prescriptive right (strangely enough) by giving up the enjoyment of it. Surely such confusion in the theory of the law is not unavoidable. It has been said that a Court of Justice will not listen to elaborate mathematical calculations, and it is, no doubt, in the highest degree desirable that the rules governing the acquisition and destruction of this most important of "urban servitudes" should be clearly intelligible not only to the judicial but to the ordinary lay mind. But if a mere observation of well-known facts and obvious phenomena provides us with an intelligible test, should we not accept it?

Whether or not the above suggestions contribute to the attainment of such a result the desideratum clearly is this,—That, given the dimensions of the window in the dominant tenement and the position of the obscuring horizon, we should be able at once to lay down a definite line of limitation, any material transgression of which by the owner of the servient tenement, except in so far as such transgression interfered with the enjoyment of that which the owner of the tenement had elected no longer to enjoy, would constitute, *ipso facto*, a breach of the prescriptive right.

* *I.e.*, to pencils from a specific point in the sky area, —inclined at any specific angle to the vertical. This is presumed to be the meaning of the expression used in the judgment above mentioned, of Bowen, L.J. (see 31 Ch. Div., at p. 572),—"The pencils of light which had passed through" the original aperture, &c. But pencils of light falling upon two windows in the position $a\,b$ and $e\,f$ respectively (see fig. 3) must of necessity either come from *different* points in the sky area, or *differ* in their angle of incidence; whereas a considerable number of identical pencils would pass through $a\,b$ and $c\,d$.

† $g\,f\,l$ would represent the original volume of light illuminating $e\,f$, as shown in section.

* Which varies as the intercepted area of sky.

NOTES.

THE evidence given by Mr. R. N. Boyd, as quoted in our last number, as to the state and prospects of the Panama Canal, should be compared with that given by M. Rodrigues, in September, 1885, by M. Bigelow, in April, 1886, and by M. Beyeler, in October, 1886. One hundred and twenty millions of cubic mètres, according to Mr. Boyd, remain to be excavated,—figures which fairly tally with those cited by the other writers on the subject. At the maximum rate of progress yet attained, this will require at least ten years to effect; and the present incidence of interest and sinking fund is one million and a third sterling per annum. The total cost of the canal is estimated by M. Rodrigues at 108 millions, if completed in 1894; by Mr. Boyd at 128 millions, if completed in 1897; and by M. Beyeler at 136 millions, if completed in 1896. The last figure amounts to more than three millions sterling a mile, or fifteen times the cost per mile of the Suez Canal. These figures are for the most part taken from the Reports of the Panama Canal Company. The *Bulletin*, however, ceased to publish the grand totals of excavations executed, in January, 1885. M. Beyeler states the amount at 16 millions of cubic mètres excavated up to October, 1886, leaving 134 millions of cubic mètres then untouched. The sum for which the Company are now responsible is a little over 59 millions sterling; made up from original capital, 12,000,000*l.*; three loans, 24,747,740*l.*; and new obligations, issued at a rebate of 55 per cent., 18,352,080*l.* How the remaining sixty or seventy millions are to be raised has not been indicated. The terms on which the new obligations are issued are significant.

MUCH has been either done or promised during the past few weeks in furtherance of various projects for providing open spaces in London. Before the end of next June the Metropolitan Public Gardens Association will have finished the laying out of certain areas as follows:—Haverstock Hill Playground (one acre); All Saints' and St. Clement's Grounds, Notting-hill (one acre), and the disused burial-grounds of the parish church of St. Dunstan (seven acres), and Holy Trinity, Stepney (one acre and a half). Miss J. Durning Smith undertakes to defray the cost, 620*l.*, of converting the churchyard of St. Anne, Limehouse (four acres); another lady contributes 500*l.* in aid of laying out the closed burial-ground of St. George, Camberwell (one acre), together with a recreation-ground at New Cross. Edward-square, Islington, is to be similarly dealt with, and Mr. J. R. Knight pays for the new gymnastic appliances in the East London Cemetery Playground at Ilford. On May 11th the Countess of Lathom will open a playground in Winthrop-street, Whitechapel, purchased for 2,300*l.*; and the Duke of Westminster has offered to take over Ebury-square Inclosure (half an acre) and to maintain it on behalf of the public. The Metropolitan Board have agreed to advance 1,600*l.* towards the works which are about to be jointly carried out by the St. Pancras Vestry and the London and North-Western Railway Company at the St. James's burial-ground, in Hampstead-road (three acres); they have also granted a loan

of 1,160*l.* to that same vestry for the throwing open the disused Holy Trinity grave-yard (two acres) in Gray's Inn-road, together with sundry small plots of land at Highgate. It is further anticipated that the burial-ground of St. George-the-Martyr, Holborn, will shortly be thrown into one with the adjacent grave-yard of St. George, Bloomsbury, that was lately opened mainly by the exertions of the Kyrle Society.

THE Hammersmith Vestry, supported by the Metropolitan Board of Works, presented a Bill to the present Parliament for securing Ravenscourt, or Scott's, Park, Hammersmith, as a recreation-ground for the public. But pending the passing of the Bill, we hear that the ground, whereof the estimated value exceeds 50,000*l.*, has been sold into private hands. The enclosure is one of the finest in the neighbourhood of London, and is justly famous for a beautiful avenue of elm trees.

THE room of archaic sculptures in the Louvre has been in part re-arranged, and that to considerable advantage. The statue known as the "Hera of Samos" has been placed in the centre, the only part of the room which is adequately lighted. Every portion of this remarkable and,—in its archaic fashion,—beautiful piece of work can now be examined with comfort. The head of a Lapith belonging to the sixth metope in the British Museum is now enclosed in a glass case at a convenient height. It will be remembered that the head was acquired in 1880, but not identified till much later, by Dr. Waldstein. A cast of the portion of the Parthenon frieze of which the original is in the Louvre is now placed in the archaic room, where the original also stands. The cast—to which we have previously drawn attention—used to stand in the École des Beaux Arts. Its value consists in the fact that it was apparently taken from the original before the heads were lost. In the cast all these, with the exception of one, are intact. At the same time, it is within the limits of possibility that the heads in the cast are restored.

A NEW species of philanthropy, in the shape of Sanitary Aid Associations, seems to be developing throughout the country and in the metropolis. These associations are principally composed of clergymen and ladies, who visit the dwellings of the poor and inculcate the importance of practising sanitary precepts. A movement has been set on foot in Richmond, headed by Lady Russell, to establish an association of this character, and some enthusiastic clerical members of these organisations on the south side of the Thames have posted notices on their church-doors inviting persons in whose houses are sanitary defects to apply to them in order that steps may be taken to have such defects remedied. Although these sanitary philanthropists will find their work in this respect much more delicate and disagreeable than the giving of alms or the preaching of sermons, yet there is undoubtedly room and need for the operations of such associations among the poor. The regular religious visitor sees many insanitary sights, which necessarily escape the view of the inspector or the medical officer, because the law only gives the latter limited powers of initiatory entry and inspection: and a regular system of frequent house-to-house visits would involve an amount of work which only a vastly increased sanitary staff throughout the country could undertake. Such associations may be useful in a special degree in the early discovery of cases of overcrowding, in the notification of infectious diseases, and in assisting to carry out the necessary precautionary measures of isolation and disinfection. The recent fatal case of overcrowding at Chiswick, where two children out of five were suffocated by the impure air of the bed-room in which they slept, was one which could hardly have occurred if an efficient Sanitary Aid Association had existed in the parish, because, though the house appeared externally large enough to amply accommodate the family, dearth of furniture and clothing had compelled the family to huddle together in one bed-room. The visitor of the Sanitary Aid Association is much more likely to find out such a state of things than the sanitary inspector or medical officer.

EFFORTS are being made to revive the Southwark Children's Mission by re-building, at an outlay of 2,000*l.*, what is known as the Rowland's Old Castle School, in Castle-yard, a *cul-de-sac* leading westwards out of Holland-street, Bankside. Established by Rowland Hill in 1802, this is reputedly the first Sunday School opened in London, and Castle-yard is considered as the parent home of the subsequent Ragged School movement. The hekkaidectagonal edifice in Blackfriars-road, long known as Rowland Hill's, or Surrey, Chapel,—but now serving for an agricultural engineers' warehouse,—was opened for worship on Whitsun-day, June 8th, 1783. Here the Rev. Rowland Hill (he had taken deacon's orders) ministered for fifty years. Dying in the parsonage-house adjoining thereto, on April 11th, 1833, he was buried beneath the pulpit, on which occasion his nephew, Lord Hill, Commander-in-Chief of the Forces, acted as chief mourner. After an interval, Hill was succeeded in the Surrey Chapel by the Rev. James Sherman, who in turn was succeeded by the Rev. Newman Hall, who remained here for more than twenty-five years. On July 4th, 1876, his congregation migrated to their new quarters in Westminster Bridge-road, at Christ Church, which, together with the adjacent Hawkstone Hall and Lincoln Tower, had been erected for them at a total expense of 64,000*l.* Hawkstone Hall was so named from Hill's birthplace, his family's ancestral seat near to Shrewsbury. On April 14th, 1881, Hill's remains were removed to Christ Church. The Primitive Methodists took over old Surrey Chapel, but, failing to secure a renewal of the lease, celebrated a final service therein on the night of Sunday, 20th March, 1881. For their use has been undertaken the erection of a new chapel, close by, and to face towards Blackfriars-road, on the freehold-sites of Nos. 190-2; to which we briefly adverted in our number of February 27th, 1886. Surrey Chapel had been renowned for its organ, built by Elliot. The pulpit we mention was frequently occupied by such eminent Dissenters as James Parsons and Jay, together with the Evangelical churchmen Berridge, Henry Venn, and Thomas Scott, disciples, like to Hill, of Whitefield. This historical chapel, indeed, may be not inaptly regarded as the Westminster of Nonconformists.

THE "British Coffee House," in Cockspur-street, now in course of demolition, was designed about 1770 by Robert Adam. The front is a fine piece of red brickwork, beautifully jointed, the vase in the niche on each side of the large central window being also a good specimen of such work. An elevation, now before us, carefully drawn and shaded in Indian ink, according to the practice of the time in architects' offices, and stated to be from the office of the architect, shows a front of 20 ft., of four stories, including the ground floor, surmounted by a balustrade, and being 46 ft. in height. The centre part on each floor is formed of a large Palladian window, 19 ft. 6 in. wide, divided into three by columns, perhaps projecting one-half diameter. This is recessed between piers, each 5 ft. wide, having an entrance in each on the ground floor. On the first floor is the niche, as above stated, and a small plain window to each of the upper floors. The vases are not shown in the drawing, but one is slightly sketched in pencil. It is to be regretted that so ornamental a specimen of the school of the brothers Adam is being demolished.*

MR. F. VULLIAMY, the uncle of the late Mr. George Vulliamy, writes to us in reference to the obituary notice of the latter which appeared in the *Builder* of November 20 of last year, to say that it was not Mr. George Vulliamy's father who sank the first artesian well at Norland House, but his grandfather, the father of our correspondent. Mr. F. Vulliamy adds a word in reference to the portrait of the late Architect to the Board of Works, which we published in the same issue of November 20 last year, and which he says is an excellent likeness.

THE house in Fetter-lane at the corner of Fleur-de-lis Court, which is about to be pulled down, has an inscription on the front to the effect that John Dryden resided there. Mr. Saintsbury, in his Life of Dryden, notices the popular belief that Dryden lived there, but states that he can find no ground for this belief. The house is old and is probably contemporaneous with the poet, and there are some features, particularly the lions' heads, which incline one to think that it may have been designed by Captain William Winde, of Bergen-op-zoom, who had a considerable practice during the Restoration.

A SMALL pamphlet, prepared by Mr. James Thropp, County Surveyor of Lincolnshire, by the direction of the County Authority, containing "Suggestions to Surveyors of Highways on the Management of main Roads and other Highways," contains a great deal of practical advice in a concentrated form. We have some doubts, however, as to the statement that "the practice of picking up and loosening the old surface before spreading a new coat of materials on a road is productive of no good whatever." We should certainly expect that it would aid in the incorporation of the new material with what then becomes its foundation. Mr. Thropp deprecates the frequent annual change and retirement of Surveyors of Highways in some quarters, and urges that their work would be much better done if the same surveyors were to retain the position for some years. We quite concur in this view, if the surveyor means business and does not intend to be only an ornamental official. He can only have begun to know his district and its peculiar conditions in the first year.

THOSE who are not prepared to go to the expense of lighting their houses by electricity, and who, perhaps, think the time has hardly arrived yet when this system of lighting can be advantageously adopted as the general system for private houses, may now, however, utilise electricity to assist them in lighting their gas. Messrs. Woodhouse & Rawson have patented a system whereby gas can be turned on and lighted, and turned off, by electric agency, from any convenient position, irrespective of the position of the gasfittings. They say, "the principle of the attachment is analogous to that of the portable electric gas-lighter, now so well known, *i.e.*, the gas is lighted by an electric spark; but the general arrangements are for permanent fitting." The application is in various forms; by the automatic gas-lighter, the gas may be turned on, lighted, or turned off, by pressing a push button. By the "hand lighter" the gas is lighted by a pull at the end of a pendant chain, after the gas has been turned on by hand in the usual manner. This appears to us rather a pleasing toy than a serious convenience; at least it is hardly worth while to have a special electric mechanism merely to light the gas. The automatic turning on and lighting may be very convenient, as it obviates the necessity of reaching up to gas taps which are not within easy reach, and avoids the chance of burning ends of matches or other lights falling on the tables or carpets. Of course the electric power for this purpose does not require a dynamo, or the expense would be entirely disproportioned to the result; a battery similar to those used for electric bells will answer the purpose. The system requires careful fitting by skilled hands, however; and whether many persons would think it worth while to have an extra system, with its extra chances of getting out of order, for the mere purpose of lighting their gas, remains to be seen. Most persons

* Cunningham, "Handbook of London, 1850," states that "The British coffee-house was kept in 1759 by the sister of Bishop Douglas, so well known for his works against Lauder and Bower, and was then, and, indeed, long after, much frequented by Scotchmen. It is now principally used for temporary public meetings."

who are particular about the manner of lighting their houses, and have money to spend on it, are now avoiding gas to great extent in their residences.

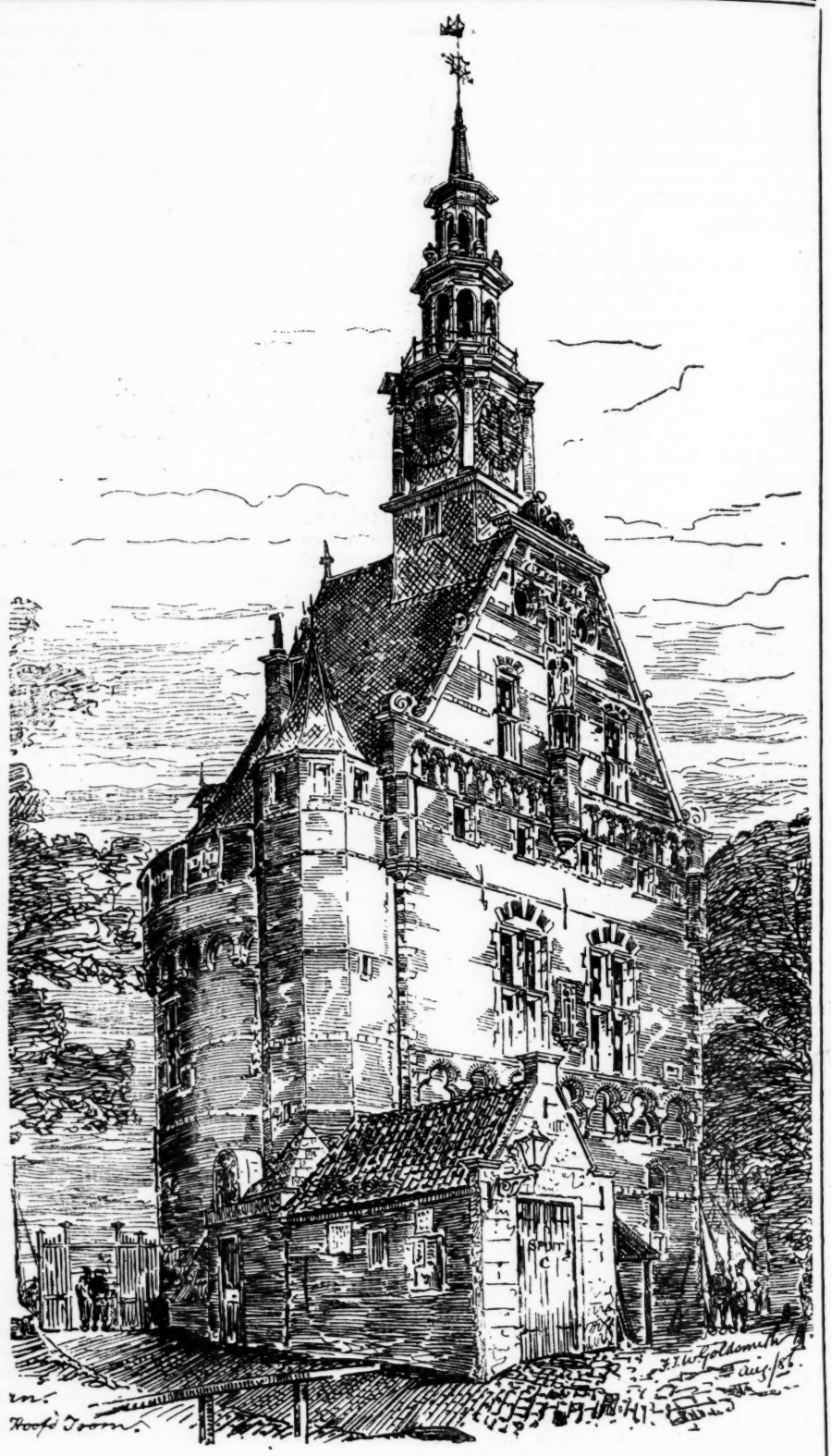
SCIENTIFIC OPINIONS ON LONDON SEWAGE.

The recent debate on the disposal of sewage sludge, at the Institution of Civil Engineers, extended over four evenings; and no fewer than thirty-seven gentlemen, the names of most of whom are well known in connexion with the subject, took part in it. Unanimity of opinion is, of course, out of the question. Neither do the regulations of the Institution admit of what is often the most useful result of a debate, namely, a division on some definite issue. But the value of the discussion is not to be discredited for these reasons. The speakers have put on record the most matured views of the different schools that they represented, and the reader may, at all events, have the satisfaction of reflecting that he is in possession of the last utterances of science, much as he may desire that they were more definite and more harmonious.

The motive of the debate appears to have been the endeavour, on the part of the chemical advisers of the Metropolitan Board of Works, to justify the proposal to boat the solid impurities which they may extract from the sewage of the metropolis into the open channel. Sir Robert Rawlinson, who represented the sceptical side in the debate, asked if the Board of Works could be really serious in proposing to barge away to sea a thousand tons of sludge per day, or 365,000 tons per annum. But Mr. Dibdin, the Chemist of the Board, admitted that this large quantity was less than a fourth part of that with which he proposed thus to deal, a quantity which he put at 4,620 tons per day, or 1,686,300 tons per year, for a volume of sewage one-sixteenth less than that now discharged into the Thames.

The essential point, to the inhabitants of London and to those interested in the commerce of the Thames, of what is to be effected by the present scheme of the Board of Works for the purification of the river, was, however, almost entirely blinked by the various speakers. Mr. Dibdin stated that the average London sewage at the outfalls contains 87 grains of foreign matter in the gallon, of which 27 grains are in a state of suspension and 60 grains in a state of solution. Assuming this to be the case, it follows, from the well-known analyses of which we have a large supply, that some 15 grains of suspended matter must either have been dissolved during the run of the sewers, appearing at the outfall in solution instead of in suspension, or that about the same approximate quantity had been deposited in the sewers by the way. The latter supposition is in accordance with the evidence, brought before the Committee on the drainage of the Houses of Parliament, as to the cost and nuisance involved in clearing out the Metropolitan sewers by hand. At all events, it is highly desirable that the chemical constitution of the sewage as collected in London should be ascertained so as to compare with its state at the outfalls.

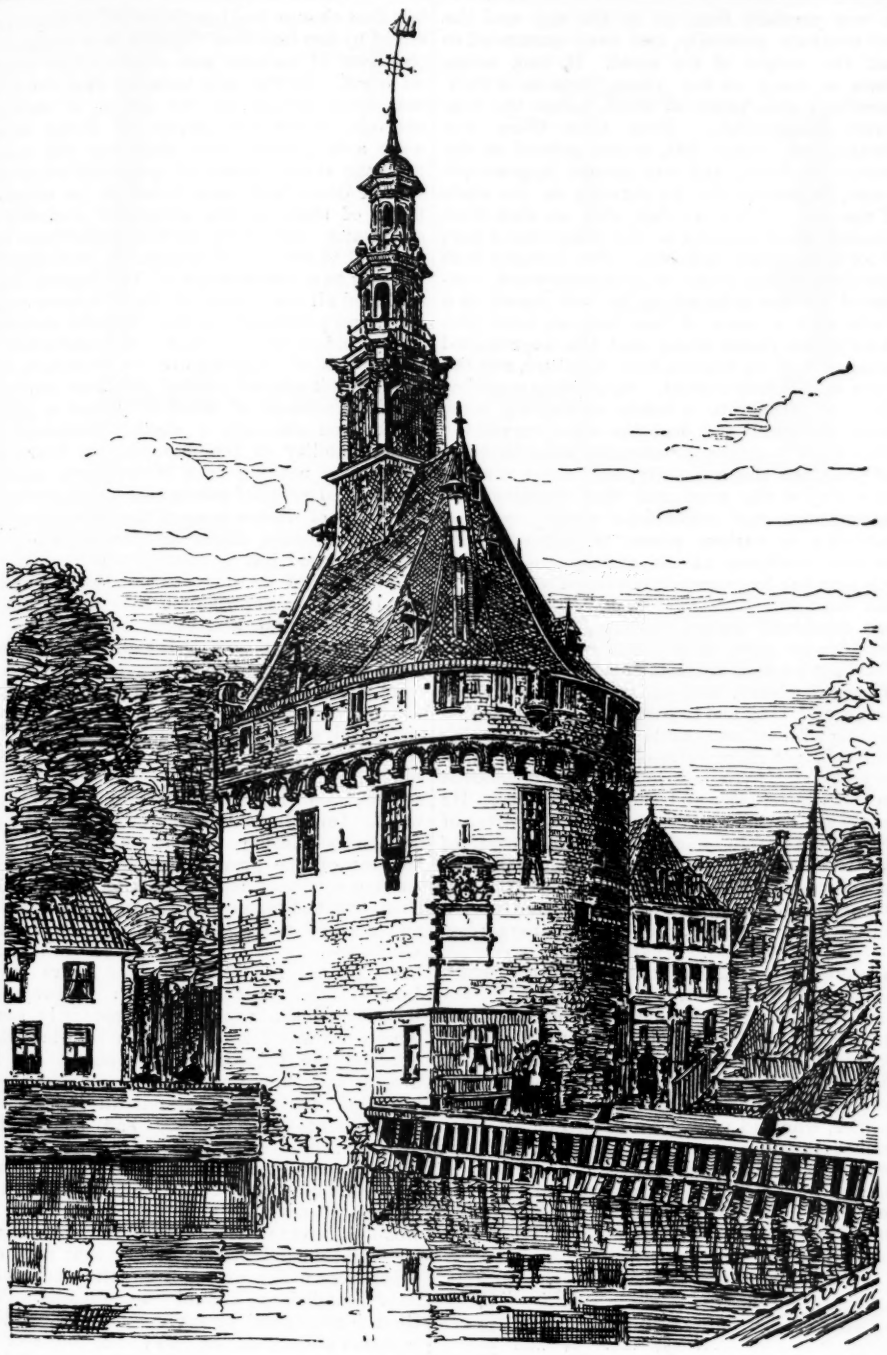
Of yet more urgent importance is the question, What is the character of the effluent to be delivered into the Thames after the treatment now proposed? It is extraordinary to find no statement of this important feature of the case. Over the broad average of those cases of which the analyses are accessible, the mean result of the various modes of treatment employed has been the removal of about nine-tenths of the matter in suspension, accompanied by an increase of the matter in solution. If this rule applies to the London sewage, as described by Mr. Dibdin, the result of the precipitating process will not very materially benefit the Thames. The remark of Dr. Edmunds that all matters in solution are free from infectiveness, is one that is in contradiction to the views of every other speaker in the debate. That the difficulty of dealing with dissolved impurities is far greater than that which occurs as to suspended matter, is evident from Mr. Dibdin's table, which shows the different effects of the same dose of lime applied to, as far as appears, the same kind of sewage. This is shown to remove, in one instance, two per cent., and in another twenty-six per cent., of oxidisable matter in solution. With such wide differences, not as stated by opposing authorities, but in the same table, it is evident that all discussion is entirely in the air without some definite statement as to the effluent actually produced by the process which throws down 4,620 tons of sludge per day, although removing only 337 tons of dry foreign matter from the sewage.



The Water-Gate, Hoorn: View from the Quay.

To another point of primary importance an equal want of due attention was betrayed in the debate; that is, the secondary action of any such admixture of lime and salts of iron as is now proposed by Mr. Dibdin. As to this there is ample evidence. Mr. Latham stated in the debate that "at Northampton iron salts were used in the proportion of 4½ grains per gallon to 15 or 16 grains of lime, with the result that the river was as foul after treatment as before. The sewage at the outfall works was made to appear clear, and the river seemed to be inoffensive; but after it had flowed a short distance, it began to turn, and was soon as black as ink, one putrefying mass." Nor is this experience confined to Northampton, or to the action of either per-salt or sub-salt of iron on lime. At Bradford, at Clifton, and at Cheltenham the same thing has occurred, chloride of iron being used in some instances, and sulphate of iron in others. Before a vast expenditure is incurred for a process which Mr. Latham says "he knew from personal experiment" would be ineffective for good, it is surely important to show that due care has been taken to prove that, for some yet undiscovered reason, it will not be effective for mischief.

Sir Robert Rawlinson, Mr. Bailey Denton, Mr. Jacob, Mr. Melliss, Dr. Edmunds, Dr. Angell, and Dr. Tidy concurred with Mr. Latham in the view that the proposed treatment of the metropolitan sewage was altogether inadequate. What we want, however, is not to be driven to count, or even to weigh, opinion against opinion, but to balance facts against facts. That a small quantity of lime in solution may be more effective than a much larger quantity in suspension is not a new discovery. Whether Mr. Dibdin has or has not allowed enough is a matter that will have to be brought to the test, not of opinion, but of fact. But that reaction of a most offen-



The Water-Gate, Hoorn: View from the Jetty.

sive nature may take place when small quantities of lime are used with apparently good results at first, is indisputable. At Hertford the exact quantity per gallon now proposed by Mr. Dibdin was applied to a very weak sewage. The result was that the effluent contained absolutely more foreign matter per gallon than the original sewage, and that an abominable nuisance was created lower down the river, at Ware.

What public opinion will expect of the Metropolitan Board of Works, before they make any further heavy demand on the ratepayers, we take to be this: first, to explain what effluent they propose to turn into the Thames; and secondly, to show what proof they adduce that the proposed treatment will not, by the secondary action of lime and iron, leave the river nearly as foul as it was before. If we take the figures cited by Mr. Dibdin, 13 per cent. of 20 grains, that is to say 2·6 grains, of dissolved organic matter will be removed from the sewage by the proposed process; add to this 90 per cent. of the total suspended matter, which comes to 24·3 grains, and we find that, from a total of 87 grains of impurity, 26·9 grains will be removed, leaving the effluent charged with 60·1 grains of foreign matter, plus so much of the 4·7 grains of precipitant as have not been thrown down. If that be the case, the effluent will still be much fouler than the sewage which, in many towns, has been found to be intolerably offensive. And there remains the question, why will such an admixture of lime and salts of iron as has been found to produce an intolerable nuisance wherever put in practice hitherto, prove innocuous in the Thames? These are not matters of hobby or of craze, but questions affecting the health of London, and the safety and salubrity of the Thames. We venture to submit that it will be wiser to reply to them now, than to leave them to solve themselves, under the action of natural law, eighteen months hence.

An Electrical Smithy.—The *Newcastle Chronicle*, in a long account of the electric lighting installation at the forthcoming Jubilee Exhibition at Newcastle-on-Tyne, says that it has been proposed to erect a small smithy to demonstrate how iron and steel can be welded by means of heat produced by the electric current. "The village blacksmith is likely to open his eyes wide with astonishment at the information to follow. For instance, it has been found that bars of iron which have thus been welded together, when placed under a testing machine have been found to break at any part rather than at the weld. Specimens of this kind of work will probably be appreciated by many who know the difficulties with which the smith has to contend. To produce a current suitable for this purpose at a considerable distance from the engine-house, it will be necessary to use a transformer, whereby a small current of great electrical motive force can be exchanged for a great current at a correspondingly lower pressure."

THE WATER-GATE, HOORN:

VIEW FROM THE QUAY.

The water-gate of Hoorn is a most picturesque building, whether seen from the narrow quay or on the other side, from the jetty run out into the waters of the Zuider Zee. The elevation towards the quay is the most ornamental, and is built of a warm red brick, a white stone being used sparingly in the strings and window jambs and mullions. The upper part projects slightly over the lower at the level of the trefoils (of chamfered brick and stone), just above which are two deeply-recessed mullioned windows, with a small niche between. In the centre of the gable is a small oriel or look-out, surmounted by the arms of Hoorn,—a horn,—and at the top, immediately under the cornice, are two dates, 1552 and 1631,—the latter that at which additions were made and repairs done.

The turret at the side of this gable is quite plain, and the window openings at the top, except one, have been built up. Beyond this turret is the circular end of the gate, seen better in the view from the Zuider Zee. A dark and dangerous way it is up to the tall flêche on the roof. In the flêche is the usual one-handed clock, and in the upper part bells; the whole is crowned by a gilded model of a ship, perhaps one of Schouten's, who first doubled Cape Horn, or Hoorn; or one of Abel J. Tasman's, both natives of this once busy but now dead city.

VIEW FROM THE JETTY.

This side of the gate is built of stone in narrow courses; the only brick used is in the circular corbels to the upper part of the chimney-stack. The stonework is joined abruptly to the brickwork; bands of the stone are carried round to the turret on the other side.

The lower part towards the sea is plain, and only relieved by a tablet with the arms of Hoorn, and three windows with a few musketry holes; but the upper oversailing part has a quaint little oriel or look-out, and many shuttered openings, from which, no doubt, many anxious and joyous faces have watched the coming and going of their own strong fleets when Hoorn built ships which beat the Spanish admirals and sailed up the Thames.

There is another gate, the east gate, but it is not nearly so interesting, and is made hideous by the generous use of white and red paint.

F. T. W. Goldsmith, A.R.I.B.A.

PICCADILLY CIRCUS.

The *Daily News*, in a leading article, on Friday in last week, rejoices at the prospect of the Metropolitan Board of Works erecting a fountain on the vacant site in Piccadilly-circus, but opines that all who are concerned would be glad to know that the fountain to be set up was a fountain of water. Our contemporary, enlarging upon this idea, acknowledges that Piccadilly-circus is not altogether the best place for setting up a haunt of the Naïads, and is even willing to allow that it may be a site demanding something of a compromise between Nature in her most artless and unsophisticated forms, and Art in its stiffest and stateliest phases, only it should be a fair compromise, and proceeds to lay down as a postulate that which nobody will be disposed to deny, that a fountain should be "a type and emblem of all that is gushing and generous and never-failing in its bounty," and gives some general directions as to the manner in which the fountain should be designed. We are informed that no decision has as yet been arrived at with regard to the disposal of the site in Piccadilly-circus which has so long remained an evidence of our want of system in matters appertaining to municipal improvements, except those of a negative character, and that there is not the slightest chance of a fountain being established there. We have no hesitation in saying that the site in question is quite inappropriate for the erection of a fountain, unless the design were treated in a somewhat similar manner to the Fontana di Trevi at Rome, or the Fontaine Ste. Michel or the Fontaine Molière at Paris, that is to say, with an architectural background. In these examples the water overflows from a basin, instead of being forced up in a jet, and this treatment is the most appropriate and effective for fountains in cities.

A fountain which is formed by a jet or jets of

water forced upwards requires a sheltered situation to set off its beauties, when

"at its height o'errun
It shakes its loosen'd silver in the sun,"

and the ill result of an exposed situation may be seen at the Crystal Palace or Trafalgar-square on a windy day, when the effect of the fountains is completely destroyed.

It is certainly time, however, that something should be done with the vacant site in Piccadilly Circus. We recently published designs by Mr. E. J. Tarver and Mr. Leonard Stokes for dealing with the site and the adjacent property, but these designs, although exhibiting considerable ingenuity of treatment, are too ambitious in character to hope for realisation, and would certainly require an Act of Parliament for their carrying out. The suggestion to ornament the space with a statue, a clock-tower, or a fountain appears to us to be inadmissible. What is wanted is to restore the plan of the circus, and this can be best accomplished by placing a building upon the vacant site. The elevation should harmonise as regards height with the existing buildings, but the design of the existing buildings need not be adhered to. If the building were to consist of an open arcade on the ground-floor the effect would be good and the convenience of the public consulted. We hope we have heard the last of the proposal of the Vestry of St. James, Westminster, to utilise the spot for a gigantic public convenience. Such things are greatly needed at the West End of London, but there is no necessity for appropriating one of the finest and most conspicuous sites in the metropolis for that purpose.

LECTURES AT CARPENTERS' HALL:

WOOD: ITS CHEMISTRY, ITS DECAY, AND ITS PRESERVATION.

THE last of the present series of free lectures was given at the Carpenters' Hall on the 6th inst., by Professor A. H. Church, M.A., on "Wood: its Chemistry, its Decay, and its Preservation." The chair was occupied by Mr. Joseph Preston, Past-Master of the Carpenters' Company.

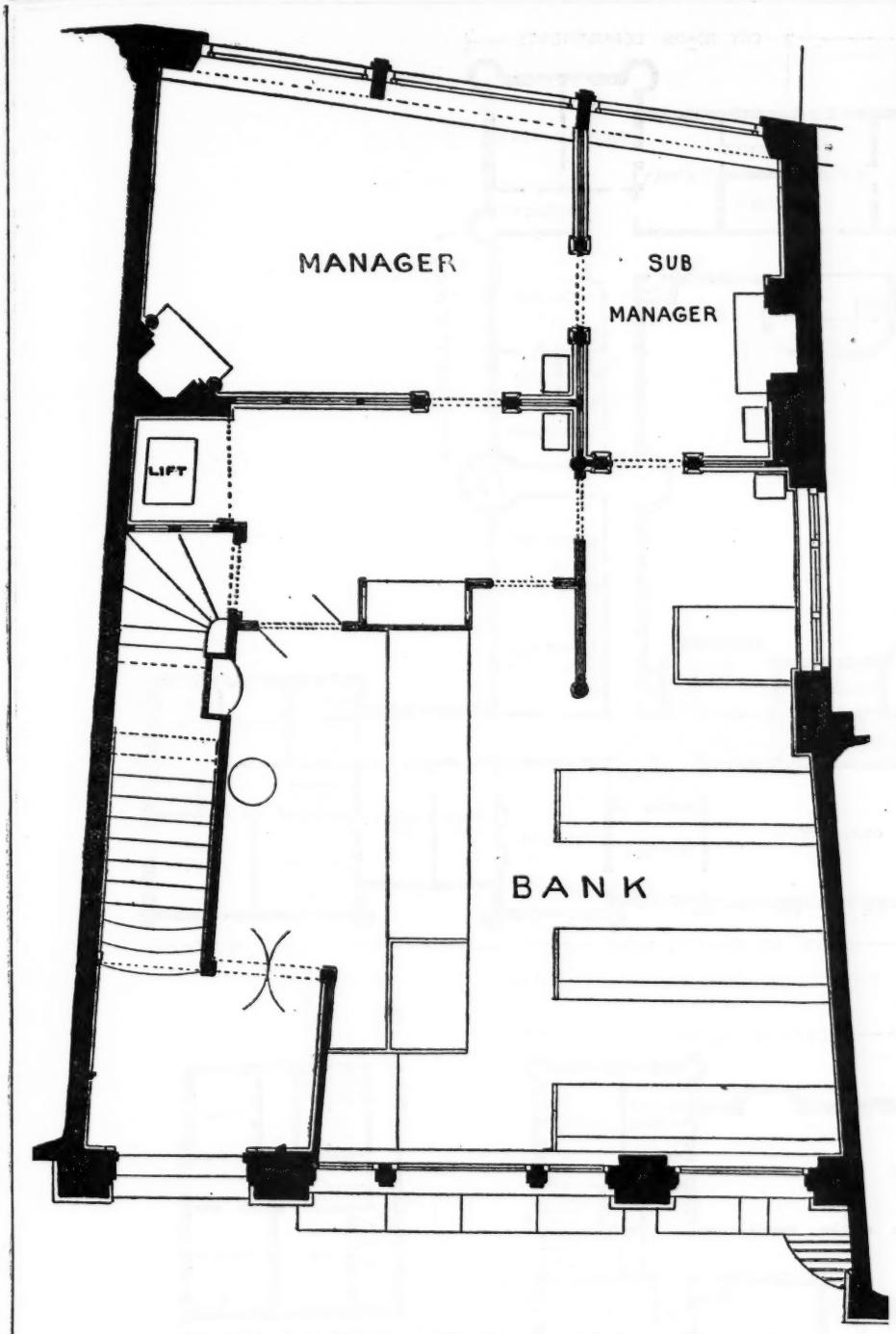
The lecturer said he could only touch the fringe of so extensive a subject, which was connected with a number of the arts, as well as with the sciences of botany and of chemistry. His treatment of it would be essentially chemical, but he would, at the same time, make his observations as simple as possible, and assume that his audience were not acquainted with the intricacies of chemical language. Having given a description, by means of diagrams, of the growth of wood, and the manner in which the rings and bark were formed, the lecturer added that the bark was a very important factor in connexion with the seasoning and preparation of timber. Experiments had shown the enormous influence exercised by the bark in retaining the moisture of the stem, and allowing the wood to dry slowly. Of some young trees, felled in the month of June, half were barked, and the remainder left in their original condition, the whole being exposed to the air in sheds with open sides. The result was that the barked trees had lost 34½ parts of their moisture in July, 39 in August, 39½ in September, and 39¾ in October, so that in one month they had practically lost all the water they could get rid of by exposure to the air; while the unbarked trees had only lost 0·41 part at the end of July, 0·84 at the end of August, 0·92 in September, and 0·98 part at the close of October. Thus by a judicious paring of the bark it was possible to regulate the amount of water to be lost by a log of timber, and so to get it to dry with more or less rapidity. Passing on to the chemical aspect of wood, the lecturer said its first constituent was air. When wood was put into water it became, sooner or later, water-logged. The gas contained in wood might be said to be common air, but practically it was not so. Common air contained, roughly speaking, three gases, chiefly nitrogen, which was unimportant from this point of view, besides oxygen, a powerful agent for causing chemical change, and carbonic acid. But these gases were not found in timber in the same proportions as they existed in the atmosphere, there being more carbonic acid, less oxygen, and more nitrogen. The quantity of air was greatest in the driest woods; for when the water went out something else must come in. Water existed as an important constituent of the wood in three states. It was partially free, as in the sap and the cell contents generally, and even amounted to half the weight of the wood. It took sometimes as many as ten years, even in a comparatively thin piece of wood, before the free water disappeared. Even then there was always some water left, which existed in the second condition, and was termed hygroscopic water, dependent for its quantity on the state of the air. On a dry day, with an east wind blowing, wood exposed to the breeze lost a part of its hygroscopic moisture. The lecturer here exhibited a thin plate of sycamore-wood, varnished on one side, which he had placed in a bottle with a piece of lime half an hour previously, the result being that the unprotected side had lost its hygrometric moisture, and the wood was slightly curved. By putting a similar piece of wood into a bottle containing some water, the result was that the wood curved the other way. It might therefore be taken that dry air produced the concavity, and moist air the convexity of the wood, and that explained the contractions and expansions which were so annoying in various pieces of joinery under certain conditions of the atmosphere, it being this peculiar hygrometric nature of wood which was most difficult to deal with. Thirdly, there was combined water, requiring a high temperature to drive it out, and sometimes that could not be done without destroying the wood. Water, therefore, was present in these three forms, and they had to consider two of them in dealing with ordinary timber,—free water, which had to be got rid of before seasoned wood could be had; and hygrometric moisture, dependent on the atmosphere and the temperature. He would say nothing about the mineral matter of wood, as it rarely amounted to 1 per cent. of the timber, and in pine, deal, and fir was often much less than that in quantity. The real substance of the wood was the organic structure, which the water, gases, and minerals had all helped to build. That organic structure consisted essentially of two substances, which he would term cellulose and lignose. The lecturer here took some prepared cellulose and put some sulphuric acid upon it, when the cellulose quickly disappeared. He next tried the same experiment with deal sawdust, but the acid merely darkened the sawdust. Dr. Hugo Müller, who had paid a great deal of attention to the manufacture of paper from different materials, had determined the proportion of lignose and cellulose in several woods. The following numbers represented portions in 100 in different woods, containing also from 9 to 14 per cent. of water:—

	Lignose.	Cellulose.	Extract.	Water.
Poplar	21	63	3	12
Fir	27	57	1½	14
Birch	28	55½	2⅝	12½
Mahogany.	28	49	10	12½
Lime	29	53	3½	10
Oak	34	39½	12	13
Box	36	48	2½	13
Teak	38	43	4	11
Beech	39	45¼	2¼	13½
Ebony	48	30	10	9½

The third column consisted of what were termed "extractives." Besides the tissues of the wood there were also the contents of the cells, and these substances were most important. One substance contained in the cells was termed albumen, and was an important thing in the preservation of timber. It was the first substance to decay by any change in the wood, and was the material on which the vegetable and animal parasites fed. If albumen were not present the parasites could not live, or they at least remained dormant and did not multiply; but the moment the albumen was present, accompanied by moisture and a suitable temperature, those vegetable and animal organisms found a material on which to feed. The fibre of the wood was unchangeable unless albumen were present. If, therefore, the albumen was got out of the wood or locked up and made insoluble so as to render it unfit for feeding those minute organisms, the wood did not decay. By locking up those organisms, making the wood poisonous, or saturating it with substances which would not allow the parasites to exist, wood would be prevented from decaying. Professor Church here exhibited a piece of cedar found by Sir A. H. Layard in the small temple at Nineveh, about 2,800 years old. This had been preserved by being excluded to a great extent from the action of the atmosphere, and though the exterior had decayed, the decay had not penetrated to any large degree into the interior. It had suffered some change, but that change had been arrested or made very slight by the fact that dryness was inimical to the lives of animals and plants which preyed on wood. It was now believed that wood did not decay simply by the action of moisture and air, unless the germs of living beings were also present, and that was the reason why the three classes of materials which prevented decay had been found to be effective Some of these agents altogether excluded air and water, and were termed hydrofuge substances. A coating of excessively hard paraffin, melting at a temperature of 150 degrees Fahr., excluded all the germs of those minute organisms, and prevented decay. Paraffin was absolutely indestructible, and was unaffected by alterations of temperature or exposure, consequently it offered one of the best materials for the treatment of wood in cabinet or joinery work; and although it slightly increased the inflammability of the material for floors and parquetry, nothing was better than paraffin. The second group of substances which prevented the decay of timber were of the poisonous class. Air and moisture might be permitted to penetrate the wood, but by putting minute quantities of chloride of mercury, carbolic acid, acridine, cryptidine, or naphthaline into it, the timber would show no alteration, except that the colouring matter was changed, until the preservative substance had escaped. Then there were substances which were non-poisonous, and not hydrofuges, but which yet prevented decay and paralysed the organisms. A small quantity of the vapour of chloroform, and many other substances, were, without being actually poisonous, able for a time to prevent the decay of wood. On all grounds, therefore, they arrived at the conclusion that timber decayed on account of the presence of living organisms, and not by direct chemical action. The lecturer then touched upon the creosoting of timber, and showed a sleeper (kindly lent, with other specimens, by Mr. S. B. Boulton) which had been in use for twenty-eight years on the London and North Western Railway, the interior of the wood being perfectly sound. Now what was the substance in coal-tar which effected the protection of timber? It had always been supposed to be the creosote,—the so-called tar acids present in the coal-tar. Experiments made lately had shown that although these substances were present in the coal-tar, and were useful in killing the germs and rendering the timber poisonous, so that neither plants nor animals would touch the wood, it was important, if the timber was to be maintained in its integrity, that solid oily substances which were not volatile under ordinary conditions should be present. Prof. Church concluded by saying he had found time to speak only of one or two of the four sections of his subject, but if he had shown that there was something in the chemistry of wood which might appeal to one's ordinary practice, and that a good deal remained to be learned about it, his object in coming there that evening would have been happily answered.

A cordial vote of thanks to the lecturer closed the proceedings.

The College of Preceptors.—The new building for this institution in Bloomsbury-square was opened on the 30th ult. by H.R.H. the Prince of Wales. The architect is Mr. Frederick Pinches, and the building and its fittings have cost 15,000*l*. The style of the new edifice is Renaissance, freely handled. The ground-floor is a few steps above the ground-line; and the façade, which has a breadth of 46 ft., rises to the extent of three stories. The depth of the new building from front to back is 87 ft. The entrance corridor is wide and lofty. On one side of it is a general or club room for members, and on the other side the secretary's and the clerks' rooms. The Council room is on the first floor. The ceiling is panelled and picked out in colour; and the walls lined to a height of 6 ft. with a polished oak-panelled dado. The remainder is hung with hand-painted Tynecastle tapestry finished in rich lacquer. Annexed are two smaller rooms, one for the committee, and the other for the officers of the college. The chimney-pieces are of carved oak, and have been executed by the School of Art Wood-carving at South Kensington. The second-floor is wholly devoted to the lecture-hall. Around it are oak book-cases, adapting it also to the purposes of a library. Mr. James Hill supplied all the locks and lock furniture.



Premises of the Commercial Banking Co. of Sydney.—Plan.

Illustrations.

EDINBURGH MUNICIPAL BUILDINGS DESIGNS.

WE give this week plans and elevations of the designs submitted in this competition by Mr. Brightwen Binyon, under the motto "The Heart of Midlothian," and commented upon in our remarks on the collected designs in a former number.

GARRISON CHURCH, STUTTGART.

THIS church, built a few years since from the designs of Professor Döllinger, is much admired in its neighbourhood, and has not, we believe, been illustrated in England.

It is built of yellow and red brick, with stone dressings, and is vaulted throughout, the actual masonry and brickwork being shown everywhere. The small plan appended shows the general arrangement, and the manner in which the gallery staircases are introduced in the transepts. The nave, which, as will be seen, is planned with side aisles for passage only, is 12 mètres wide over all (about 40 ft.). The interior derives a rich effect from the employment of stained-glass windows, as well as the introduction of statues in the niches of the large piers at the crossing. The church seats 1,400 persons.

ST. MARGARET'S CHURCH, IPSWICH.

THE drawings which we illustrate to-day are part of a set which obtained the National Silver Medal at Kensington last year for Mr. Harry Percy Adams, of Ipswich; they illustrate a fine specimen of a Suffolk church, containing a beautiful example of a double hammer-beam roof. The church stands on the north side of a large open square facing the town. Among its curiosities is an octagonal font bearing on one side the singular inscription, "Sal et Saliva," on a scroll. On each side of the porch is a gargoyle, that on the west side representing a monk and that on the left a nun.

WEST BROMWICH UNION OFFICES.

THE accompanying illustration represents the new board-room and relief offices now in course of erection in Hallam-street, West Bromwich, on land adjoining the workhouse buildings, from the designs and under the superintendence of Messrs. Henman & Timmins, architects to the Board of Guardians.

This block of buildings is entirely detached from the rest of the workhouse, and contains, on the ground-floor, separate entrances for the guardians and for the applicants for relief, two committee-rooms, a large waiting-room and relieving officer's rooms, lavatories and conveniences; on the first floor, the board-room, another committee-room, clerks' offices, strong-room, and guardians' retiring-room, lavatories, and conveniences.

Externally the buildings are faced with best red pressed bricks, with Grinshill stone dressings, the roofs being tiled. Internally all the corridor floors are of concrete, laid with encaustic tiles. The timbers of the board-room roof are partly left to view, panelled and richly moulded. All the internal joiner's work is of pitch pine.

In addition to the open fireplaces provided, the buildings will be heated by employing the excess of steam now generated by the laundry-boilers.

New vagrant-wards, in part on the "separate-cell" system, with caretaker's house adjoining, and new receiving-wards for males and females, are also being erected, from designs by the same architects.

Messrs. Horsley Bros., of Birmingham, are the contractors for the whole of the works. Mr. J. Jackson, of Newcastle, Stafford, has the heating in hand. Mr. Lovatt is acting as clerk of the works.

THE COMMERCIAL BANKING COMPANY OF SYDNEY'S NEW BANK.

THIS corporation, established in Sydney in the year 1834, has recently constructed new banking premises in Birchin-lane, Lombard-street, of which we give an illustration.

The Birchin-lane front is constructed in Portland stone, with red Peterhead polished granite pilasters and Aberdeen grey polished granite bases.

The building has been designed in a Classic style with somewhat of Greek feeling, in order to give massiveness of character while preserving as much light as was possible under the circumstances of the frontage being to a very narrow street. The rear is lighted from the churchyard of St. Edmund's.

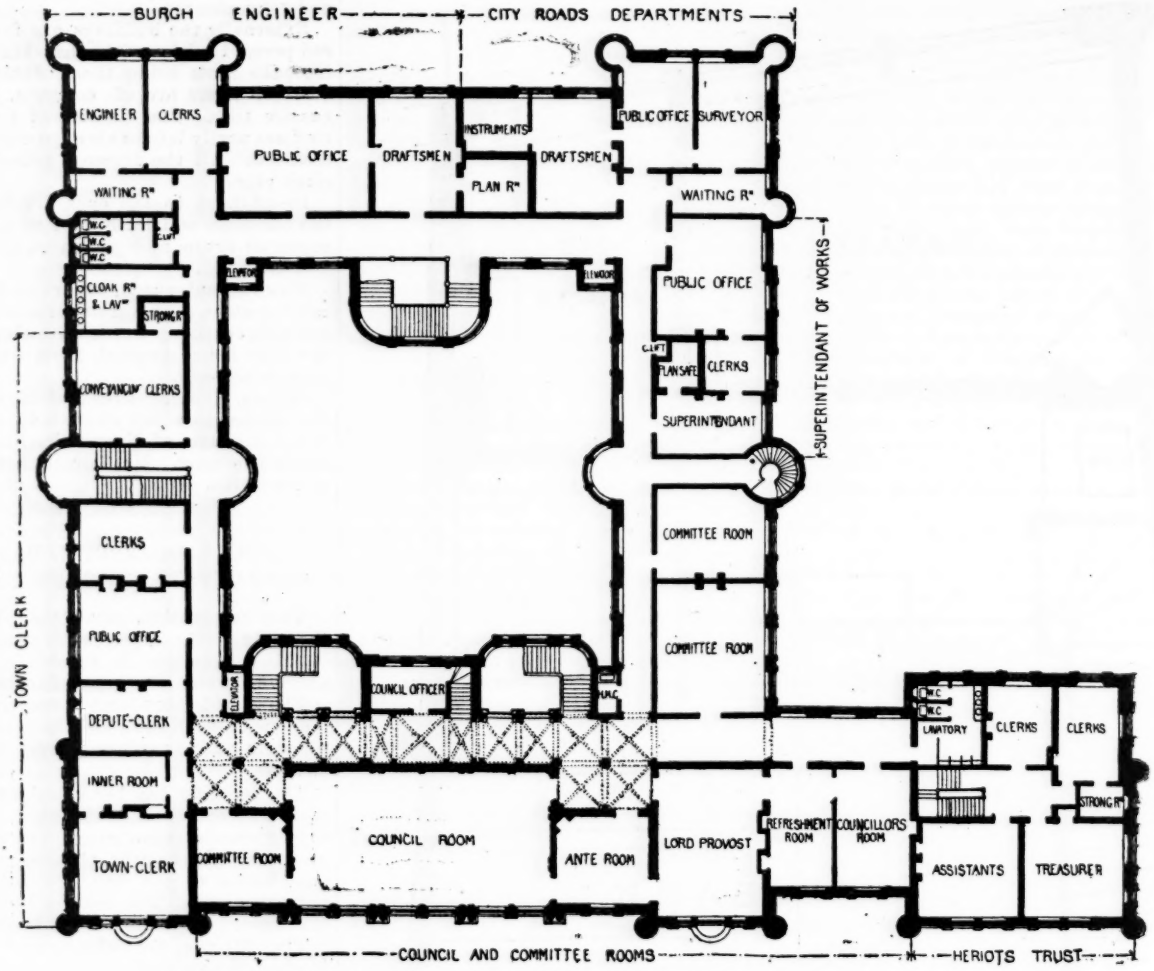
The fittings are throughout in polished fumigated wainscot.

The general contractors were Messrs. Ashby & Horner; the granite was supplied by Mr. A. Nicholson; the constructive ironwork by Messrs. Handyside; the heating apparatus by the Æolus Waterspray Co.; the mosaic work by Messrs. Burke & Co.; the lift by Messrs. Waller & Co.; the strong-room doors and fittings by Messrs. Chubb; and the gasfittings by Mr. Biggs. Mr. E. Roscoe Mullins was the sculptor.

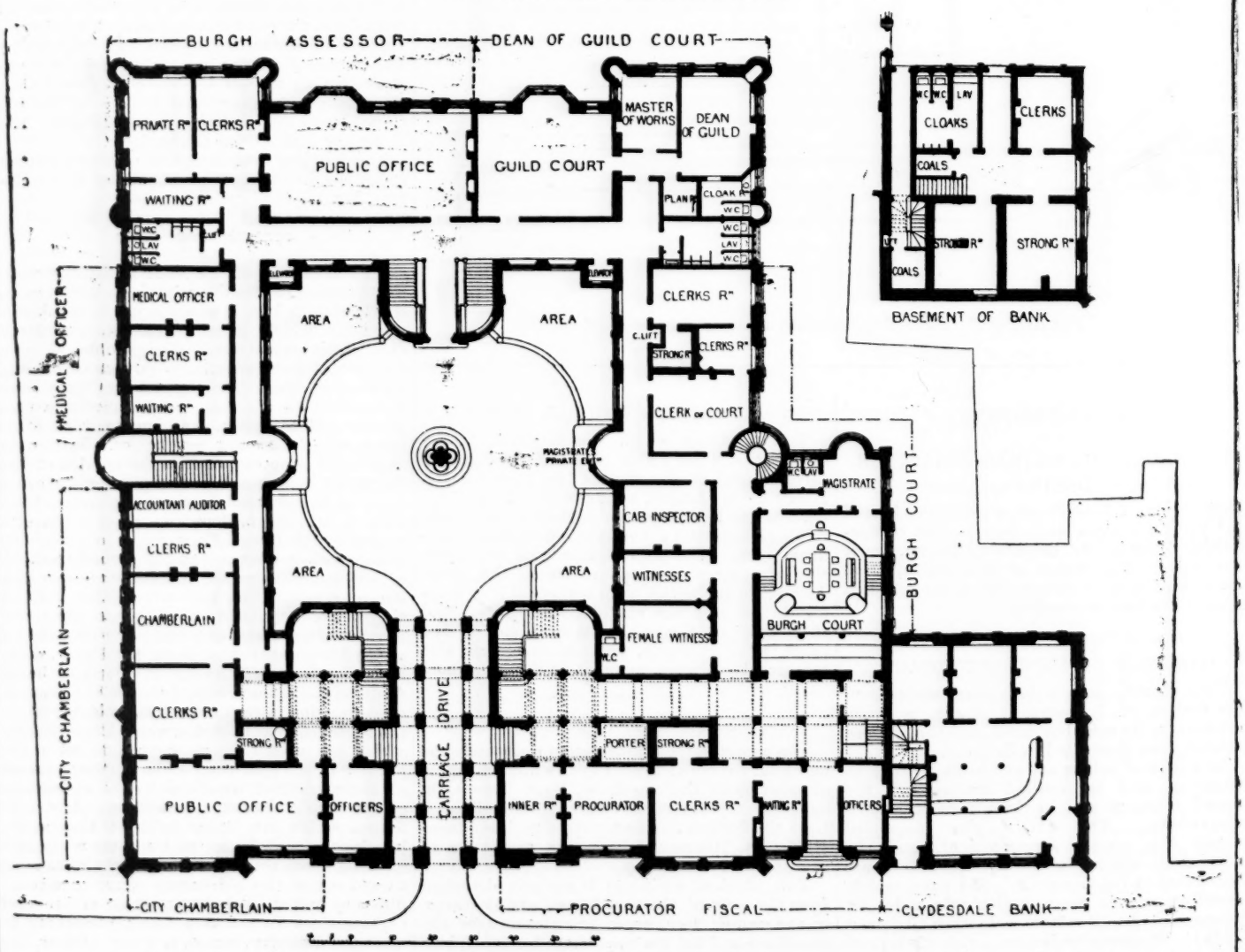
The building was designed and constructed under the direct superintendence of the architect, Mr. W. W. Gwyther.

The Housing of the Poor in Edinburgh.

The question of dealing with insanitary houses in Edinburgh has, it would appear, reached a stage at which it will demand henceforth careful consideration. The Public Health Committee have very large powers of dealing with this class of property. They can (according to the *Scotsman*) summon a proprietor before them, and make him show cause why he should not be called upon to repair the property, or if in the opinion of the Court the houses are past repairing, an order may be issued closing them up altogether. This is only done, however, after a careful report by the Burgh Engineer. In 1885, 300 houses were condemned as being uninhabitable, of which a considerable number were put into decent repair. The rest were either left as they were, or pulled down. Last year the number of such houses reported on was 491, of which 190 were shut up as uninhabitable, while at September last 179 were in course of being dealt with. These houses are of the poorest class, ranging in rent from 30*s.* to 5*l.* a year,—the rents being collected weekly. The difficulty which has arisen is in connexion with the housing of the poor people who are dispossessed of their wretched dwellings by the operations of the Public Health Committee. Any new houses which are being built in the poorer localities cannot be let at the same rents, and it would seem that the families who have been turned out of the old houses experience great difficulty in finding shelter. There are several organisations in the city doing something to meet the difficulty, which, it would appear, has been presented to the Public Health Committee in a concrete shape by a report which, it is understood, the Burgh Engineer has prepared on the subject.



FIRST FLOOR ABOVE HIGH STREET LEVEL.



GROUND FLOOR, HIGH STREET LEVEL.

Edinburgh Municipal Buildings Competition.—Plans of Design by Mr. Brightwen Binyon.

PHOTO-LITHO. SPRAGUE & Co 22, MARTINS LANE, CANNON ST, LONDON, E.C.

WEST BROMWICH UNION, RELIEF OFFICES, ETC.—MESSRS. HENMAN AND TIMMINS, ARCHITECTS.

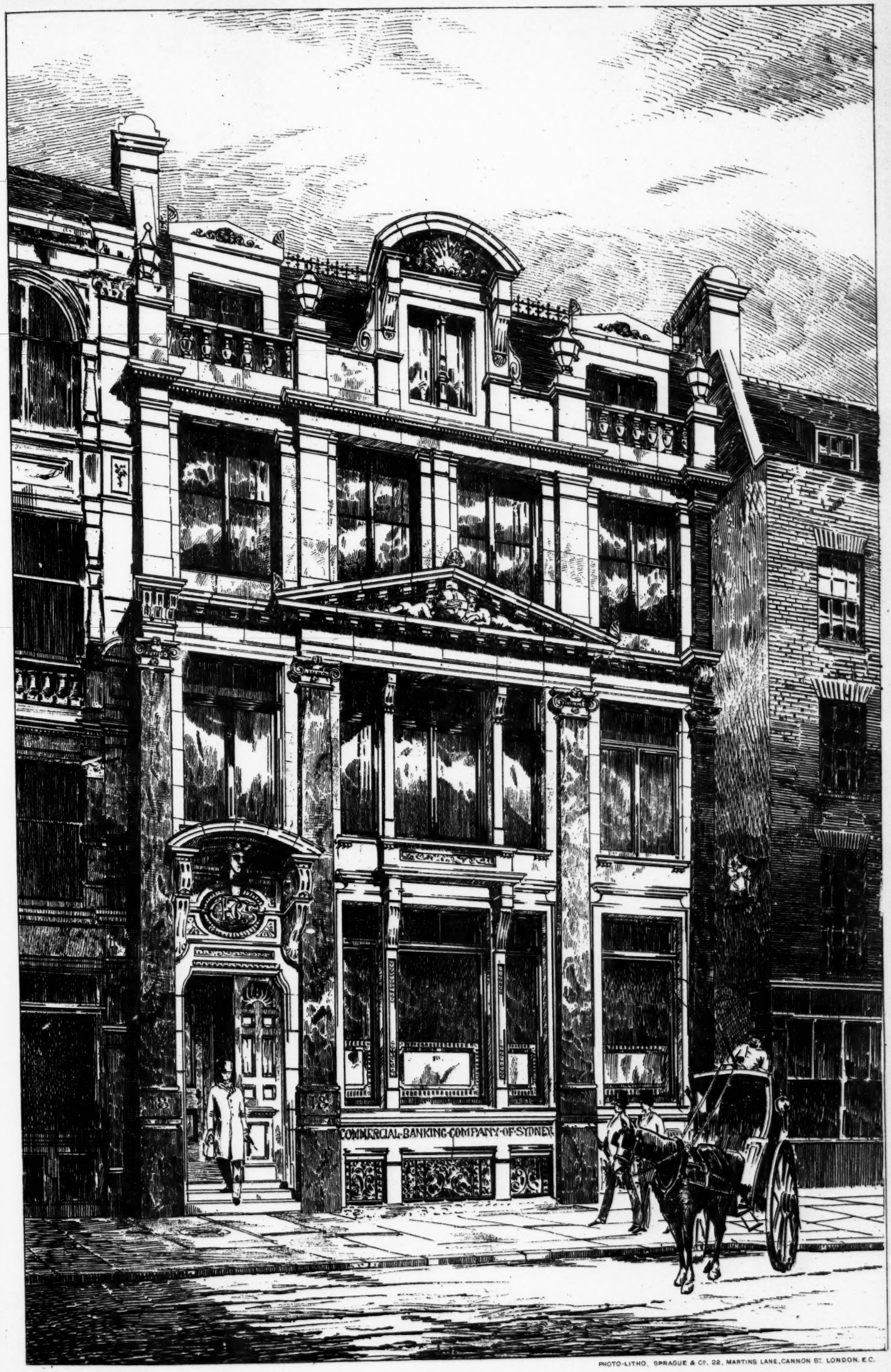
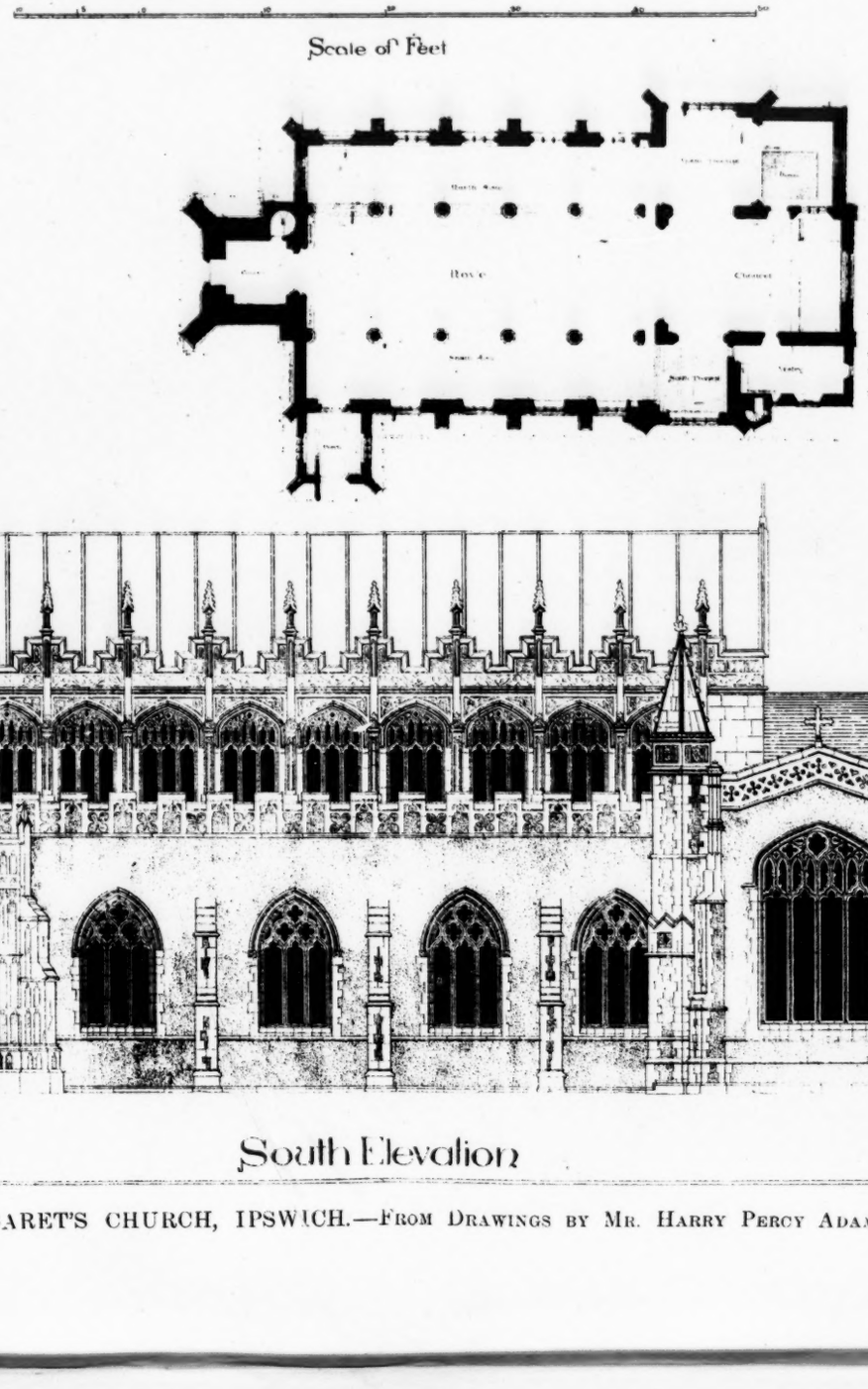


PHOTO-LITHO. SPRAGUE & Co. 22, MARTINS LANE, CANNON ST. LONDON. E.C.

PREMISES FOR THE COMMERCIAL BANKING COMPANY OF SYDNEY.—Mr. W. W. Gwyther, F.R.I.B.A., Architect.

Saint Margarets Church Ipswich



South Elevation

C F Kell Photo-Lith & Printer 8, Furnival St Holborn, London, E.C.

ST MARGARET'S CHURCH, IPSWICH.—From Drawings by Mr. Harry Percy Adams

AWARDED THE NATIONAL SILVER MEDAL, SCIENCE & ART DEPARTMENT

SAINT MARGARETS CHURCH IPSWICH

DETAILS OF THE NAVE

Note { All stone joints are taken from actual measurement

The finials to parapet of Clerestory are new, having been added in the year 1872, the whole of the Clerestory was cleaned at the same date

Plaster

The panels of the roof are decorated in colour, this work was executed at the end of the seventeenth century, on the oak boarding in the renaissance style by Flemish artists, the top panels are a later edition in plaster

As the roof was found to be thrusting out the clerestory walls, Iron ties rods were added about 12 years ago

Exterior Elevation North Aisle

Transverse Section

Interior Elevation of One Bay

Scale of Feet

C F Kell Photo-Lith & Printer 8, Furnival St Holborn, London E.C.

ST. MARGARET'S CHURCH, IPSWICH.—FROM DRAWINGS BY MR. HARRY PERCY ADAMS

AWARDED THE NATIONAL SILVER MEDAL, SCIENCE & ART DEPARTMENT.

West Elevation

The Heart of Midlothian

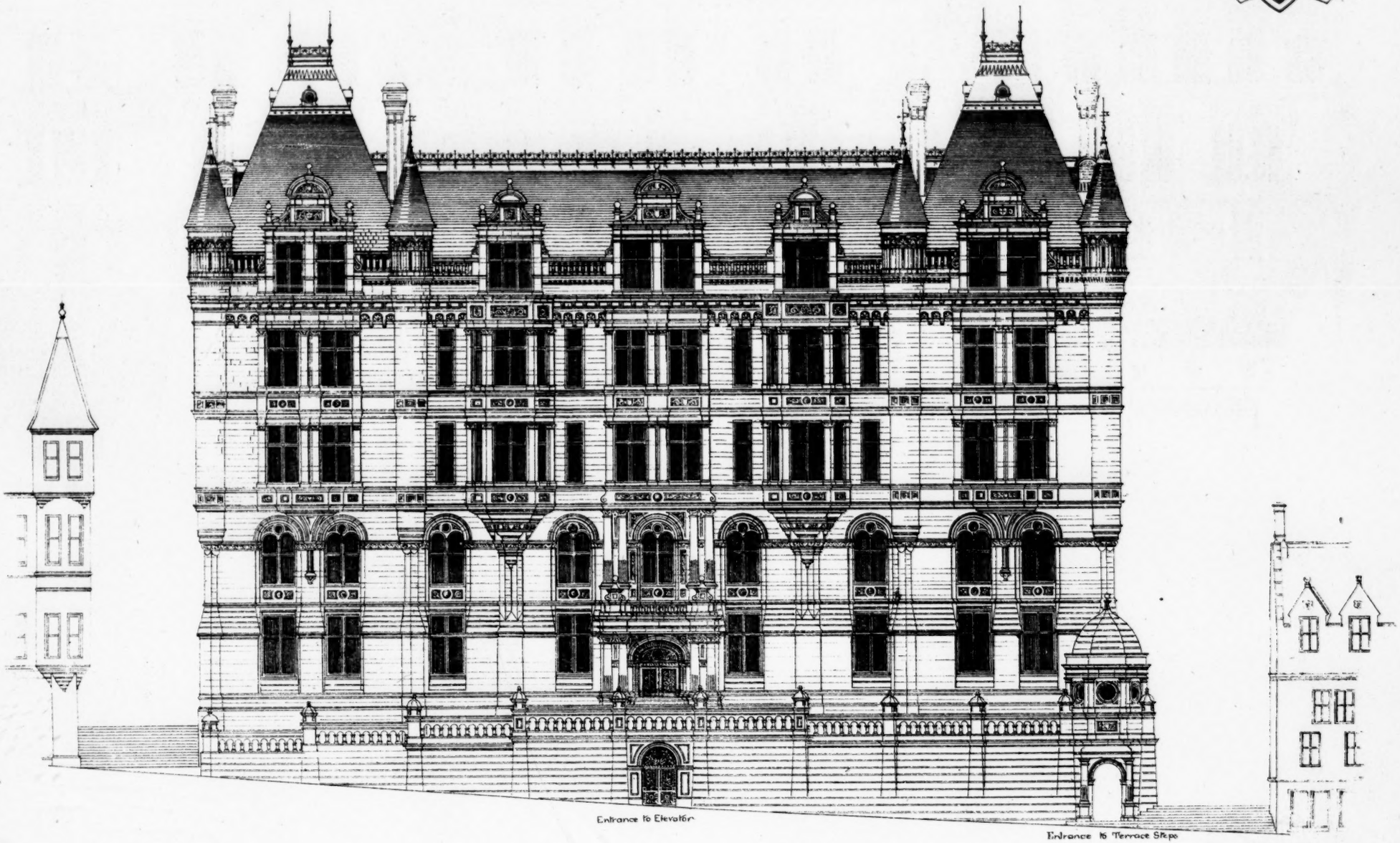
C.F.Kell Photo-Lith & Printer 8.Furnival St Holborn, London.E.C

EDINBURGH MUNICIPAL BUILDINGS COMPETITION.—Design submitted by Mr. Brightwen Binyon, A.R.I.B.A.

C. F. Kell Photo-Lith & Printer 8, Furnival St. Holborn, London, E.C.

GARRISON CHURCH, STUTTGART.—PROFESSOR DÖLLINGER, ARCHITECT.

The Heart of Midlothian

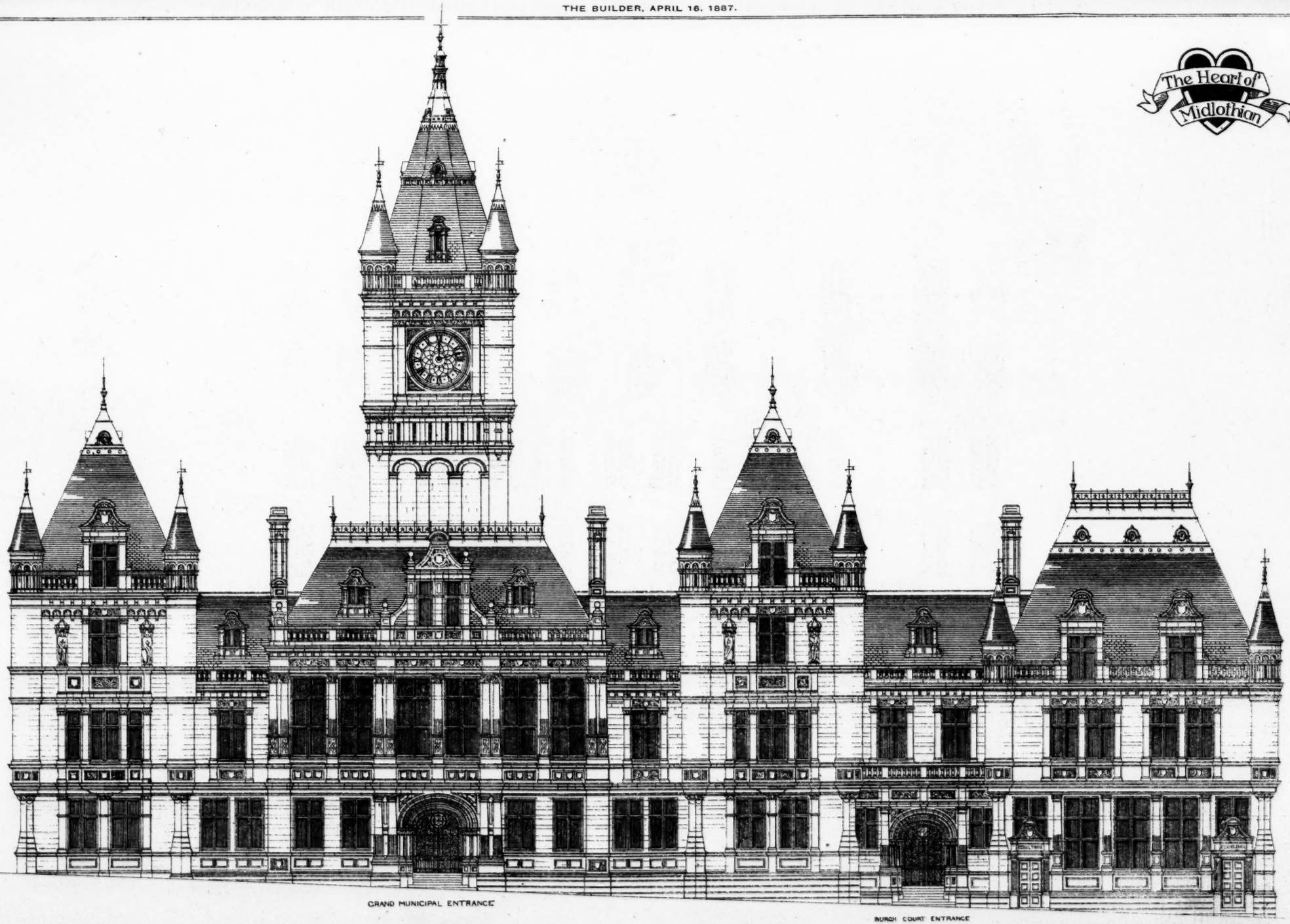


Cockburn Street Elevation

EDINBURGH MUNICIPAL BUILDINGS COMPETITION.—Design submitted by Mr. Brightwen Binyon, A.R.I.B.A.

C.F. Kell Photo-Litho & Printer, 8, Furnival St. Holborn, London, E.C.

The Heart of Midlothian



GRAND MUNICIPAL ENTRANCE

BURGH COURT ENTRANCE

High Street Elevation

EDINBURGH MUNICIPAL BUILDINGS COMPETITION.

C.F. Kell Photo-Lith & Printer 8, Furnival St. Holborn, London, E.C.

METROPOLITAN SEWAGE DISPOSAL.

PARKES MUSEUM OF HYGIENE.

A PAPER dealing with this important subject, by Mr. J. Bailey Denton, M.Inst. C.E., was read at the Parkes Museum of Hygiene on the 6th inst. Professor Corfield occupied the chair, and there was a good attendance.

The paper was read by Mr. Bailey Denton's son. At the outset the author said that the subject was unique in the difficulties and contradictions that surrounded it. Sewage in itself was a complex substance, consisting of that which was theoretically very valuable, and practically, at the present time, nearly worthless. Made up of two parts,—the liquid and solid,—sewage, to be dealt with in any way satisfactorily, must have those parts separated from each other, when the liquid portion might become clear and bright, whilst retaining both its fertilising and obnoxious qualities, and the solid portion might be rendered ductile and portable, though it had lost the major part of that which would make it worth the cost of carriage. Upon the question of the value of sewage as a fertiliser of land, England seemed to have changed its mind for a time, not because it had failed in producing an increased supply of food for the people, but because the means adopted for its utilisation had in some instances commercially failed to secure a profitable return. As he did not in any way participate in the views which held possession of the minds of the Metropolitan Board of Works and other local authorities in relation to sewage farming, who made the difficulties attending it (and there were many) an excuse for getting rid of the "nasty stuff" in the quickest way they could, he desired, as a close observer of what could be done in the way of sewage utilisation, and as a sewage farmer himself, to place on record in a few words his conviction that it had been solely owing to the want of technical knowledge on the part of the farm managers that the expectations formed with regard to the application of sewage to land had not been realised. Like every other trade or business, sewage farming could only be learnt by apprenticeship, and only perfectly practised when experience had shown what to do and what to avoid; yet every member of a local board, whether he were a draper, or a printer, or a publican, thought he could direct every step that should be taken, either to cleanse the sewage or to make the farm pay. He believed, in point of fact, that as a member of a local board he knew as much about farming as a Lothian or Lincolnshire farmer, and as much about the cleansing of sewage as a Liebig or a Frankland. That was an anomaly, for we did not find that a farmer or a chemist, however successful, would turn draper, or printer, or publican with equal confidence. Why the governing sanitary authority appointed for the "better management" of London, the capital of the British Empire, and the most important if not the most populous city in the world, should exhibit a twofold want of loyalty to the common interests of the nation by polluting the Thames, at the same time that it disregarded the reproductive value of the sewage to be disposed of, would remain unexplained so long as the Metropolitan Board of Works continued indifferent to one of its primary duties,—for the performance of which it was called into existence,—the purification of the Thames. The fact that Paris, the capital of France; Berlin, the capital of Germany; and Hamburg, Breslau, and Dantzic, the capitals of subordinate states, were turning to advantage the sewage they discharged, whilst St. Petersburgh, Moscow, and Warsaw were preparing to do the like,—seemed to have no influence whatever on the Metropolitan Board; although these European cities had all been treated upon examples afforded by, and information obtained in, England. Instead of closely studying what had been done in this country and abroad, the Board had been content to represent to their constituents that it would be extravagant to expend between three and four millions of money in extending the outfalls a distance of twenty miles down the river, although that plea could be readily shown to be a fallacy. Directly those big figures were turned from capital into interest, they happily meant no greater charge upon the ratepayers than the annual cost of chemicals and labour in mixing would involve, apart from the interest on the capital outlay in additional permanent works at the outfalls. Nevertheless, it had been decided to construct underground tanks,—which in themselves were very objectionable,—to be followed by an expenditure of three times that amount if persevered in. Most unfortunately for the interests of agriculture, the Board had determined that those tanks should be added to those at present existing at the Barking outfall, in a district where the population was increasing at a greater ratio than in any other metropolitan suburb, and where the extension of building was so rapid that it would soon crowd out all possibility of using the collected sewage free from local nuisance, in the way which Sir Robert Rawlinson had said might be adopted for distant distribution from the outfalls. It was, indeed, difficult to understand how a body of men ordinarily engaged in various important branches of commerce should reject the recommendations given them by the Royal Commission, when a careful investigation with unprejudiced minds would have shown them that for the expenditure of three and a half millions,—meaning a rate of only a penny in the pound,—in extending the outfalls to a point beyond Hole Haven Creek, with an addition for works there of no more money than the Board were now about to expend at the outfalls, they could purchase 4,500 acres of land and construct the necessary works for the treatment of the sewage in a locality where they could not only have secured for future generations the utilisation of the sewage, but could do so in a way to entirely free the river from pollution into the bargain. As his (the lecturer's) name for some years past had been more closely associated with intermittent filtration than with other means of sewage treatment, he wished to say, by way of parenthesis, that he was not less the advocate of wide irrigation, which he deemed to be the most profitable mode of utilising sewage, than his friend Dr. Alfred Carpenter, or Sir Robert Rawlinson, though he adhered strongly to the opinion,—after a somewhat wide experience,—that intermittent filtration ought always to be combined with wide irrigation as a safeguard, or perhaps it would be better to say as a means of removing the difficulties of the sewage farmer when the land under his care required relief on occasions of great downfalls of rain, or by reason of the condition of the cropping, or when it was desirable to save labour in the night time and on Sundays. Up to the commencement of the present century water-closets were unknown; the statelier mansions of the wealthy and the humbler dwellings of the poor were alike provided with receptacles for fœcal refuse, which had to be removed by nightmen, and which process was attended with very great nuisance. When water-closets were introduced in 1810 they were only intended to wash the putrescible matter from dwellings into cesspools, from which the overflow found its way into the watercourses and rivers, thus producing a polluted condition, and substituting one class of nuisance for another. It was not fifty years since the first effort was made at district house sewerage. That was superinduced by the copious use of water attending the introduction of water-closets and the establishment of additional water companies which took place about the same time. Nothing could be more regretted by all earnest thinkers than the conduct of the Metropolitan Board in 1887, which must bring upon us the ridicule of the world, in resorting to the homœopathic doses of 3·7 grains of lime and 1 grain of sulphate of iron, with a sprinkling of permanganate of soda, per gallon, for the purification of the sewage of the metropolis in face of the truth that the great towns of the North of England, Leeds, Bradford, Sheffield, &c., after trying every known kind of chemical applicable to sewage treatment, had come to the conclusion that nothing less than one ton per million gallons (taking the average quality of town sewage) could render their sewage effluents admissible into rivers. Common sense told us that to apply a minimum quantity of chemicals, as proposed by Mr. Dibdin, to an average outflow of sewage from a densely populated city of the character of London, was in itself an absurdity, and the manner in which the Metropolitan Board of Works seemed to have arrived at those homœopathic doses was,—if rumour spoke truly,—as singular as it was unworthy the magnitude of the object. Although Sir Christopher Wren in the seventeenth century proposed certain works connected with the "new sewers and backwaters of Westminster," and the Fleet Ditch and other tributaries of the Thames were turned into common sewers in the eighteenth century, it was not until John Martin, the eminent painter, had called public attention to the disgusting state of the Thames that it was found necessary by systematic design to intercept the sewage of dwellings and prevent its discharge into the Thames. It was twenty-two years subsequently to Martin's appeal that the Metropolitan Board of Works took the place of the several Commissions of Sewers then existing for "the better management of the metropolis." The Act constituting the Board, however, was not passed until after the Consolidated Commissioners of Sewers had sought plans for the drainage of London by public competition (1849), the result of which was the adoption of the concrete design of Mr. Frank Foster and Colonel Haywood, the present City Engineer. The government of that day, by the First Commissioner of Works, Sir Benjamin Hall, referred the whole question to Captain Douglas Galton, R.E., and the late James Simpson and Thos. C. Blackwell, C.E.'s (1857), who proposed that, instead of adopting the points of outfall recommended by the engineers of the Metropolitan Board of Works, the sewage should be taken down the river and discharged on the northern side of the river, near Mucking Lighthouse, in Sea Reach, and on the southern side near Higham Creek, in the Lower Hope. He gave that brief history because it was desirable at the present juncture to realise the fact that the referees of 1857 recommended the extension of the outfalls to points almost as far down the river as the point suggested by the Royal Commission on Metropolitan Sewage Discharge in 1844, with the simple but very important difference that, whereas the referees would have been satisfied with the discharge of crude sewage into Sea Reach, the Royal Commission, after the experience gained, objected to any discharge into the river until the solid matter had been separated from the liquid, when they would admit the latter only if carried down and discharged "at least as far as Hole Haven." It was true that the Metropolitan Board, in 1857, successfully over-ruled the opinions expressed by the referees, but that was not done until several leading members of both Houses of Parliament had forewarned the Board that the river might be made (as it had now been made) a main sewer for the whole of London, and that our magnificent river might be turned into a "cesspool" by the discharge into it of the sewage which it was the duty of the Metropolitan Board to dispose of without causing any nuisance. The late Lord Derby called attention to the fact that there was no express provision in the Act constituting the Metropolitan Board that the *modus operandi* was to be by intercepting sewers, though it was well understood, his lordship said, "that the sewage of the metropolis should not be allowed to be poured into the river until it had undergone the process of deodorisation." And what was also true and even more pertinent to the present condition of things, was that Robert Stephenson, whose opinion would ever command the attention of Englishmen, stated that he believed that sewage would eventually be made useful for agricultural purposes, and he therefore thought it impolitic to enter into any larger expenditure than could be helped for the present (1854-5), even if it were found necessary to carry the sewers down to Sea Reach. Robert Stephenson uttered those words twenty-eight years ago, and it was "Sea Reach" that that the Royal Commission (Lord Bramwell's), after eighty-one days' close attention to the subject, now declared should be the place of discharge, believing "that the existing evils imperatively demand a prompt remedy." Could any words more closely prove the foresight of Robert Stephenson? Lord Bramwell's Commission consisted of men occupying the highest position in practical science, and known to be specially acquainted with the subject they were selected by the Government and appointed by her Majesty to inquire into and report upon, *i.e.*, "the system under which sewage is discharged into the Thames by the Metropolitan Board of Works." They made two reports, and in the second they said:—"We are of opinion that some process of deposition or precipitation should be used to separate the solid from the liquid portions of the sewage. . . . . That the solid matter deposited as sludge can be applied to the raising of low-lying lands, or burnt, or dug into land, or carried away to sea. . . . . But we believe

that the liquid so separated would not be sufficiently free from noxious matters to allow of its being discharged at the present outfall as a permanent measure. It would require further purification; and this, according to the present state of knowledge, can only be done effectually by its application to land. . . . . And if suitable land in sufficient quantity and at reasonable cost cannot be procured near the present outfalls, we recommend that the sewage liquid, after separation from the solid, should be carried down to a lower point in the river, at least as low as Hole Haven, where it may be discharged." Apart from chemical considerations, it had been made manifest that it was not in any way desirable to turn the sewage liquid after separation into the Thames at the present outfalls, however much the upland water might be mixed with tidal water in that locality. That would appear certain from the fact that whereas the quantity of upland water flowing at times down the river to mix with the sewage as it left Barking and Crossness at ebb-tide might be as little as 750,000,000 gallons in twenty-four hours, the quantity of sewage discharged might reach 160,000,000 gallons in the same time, or more than one-fifth of the upland flow; the least proportion of sewage recognised as safe for riparian interests being five per cent. of the river flow, or one-twentieth part. The Royal Commission in their first report called attention to that fact in the following words:—"The flow of sewage proper is estimated at an average of 16,000 cubic feet per minute, which is 23,000,000 cubic feet per diem. Now the river at low water in the neighbourhood of the outfalls is about 2,000 ft. broad, and has a sectional area of about 30,000 square feet, so that there is discharged into it every day as much undiluted sewage as would fill a length of 750 ft. of this part of the river at low water." These facts, the lecturer thought, were sufficient of themselves, without any reference to chemistry, to prove that the metropolis was committing a suicidal act in allowing the Metropolitan Board to maintain a pollution which, though it might be slightly mitigated by Mr. Dibdin's recipe, would still reduce the river into a flow of liquid sewage through the dock region of its course,—a fact which could not fail, on a revisitation of cholera, to be attended with fatal results. The reason given by the Metropolitan Board, or rather the Works and General Purposes Committee, was most curious. While actually putting on one side the recommendations of the Royal Commission, they stated that, with a view of complying with their recommendations, they had voted 1,000*l.* for the purpose of experiments on successive quantities of 1,000 gallons of sewage, subsequently increased to 100,000 gallons, and then to 250,000 gallons. Those experiments they afterwards declared were sufficient to show, in face of what all past experience had so strongly proved to be the reverse, that no practical advantage accrued from the additions to the sewage of more precipitating matters than 3·7 grains of lime and 1 grain of sulphate of iron, which they deemed all that was really necessary for facilitating the natural tendency of solids to deposit. They further stated that the effect of adding large quantities of chemicals insured only a more perfect clarification without materially affecting the solid constituents of sewage. The committee having come to these conclusions induced the Board, as a body, to vote a sum of 5,000*l.* (in November, 1884) for the erection of works at Crossness outfall for the experimental treatment of 1,000,000 gallons of sewage daily, which is just one 160th part of the actual quantity of sewage discharged at the outfalls. The result of those experiments, the Committee declared, confirmed the results first arrived at by the Chemist of the Board, and authoritatively asserted that the sewage could be "sufficiently" clarified by the addition of 3·7 of lime and one grain of protosulphate of iron to each gallon of sewage, which he (the Chemist) had, by that funny calculation of his own, arrived at as the exact quantity that would effect the desired precipitation; and the Committee took upon themselves to add that, in addition to the removal of the solids, the "grosser odours of the sewage are destroyed, and the foul and offensive appearance of the sewage removed." These were strong words after the experiences of the last thirty years. With regard to the Canvey Island scheme, its governing features were that it obviated altogether any discharge of the dry-weather sewage, both solid and liquid, into the river between Blackwall and Sea Reach, and that its area, 4,383 acres, with its attendant physical conditions, afforded remarkable facilities for (1) the deposition or treatment of the solid portion on its surface without nuisance of any kind or occasion for removal from the site of deposition; (2) the utilisation of the liquid sewage for irrigation on the island or on lands in Essex and Kent; and (3) the purification of the liquid after its separation from the solid by filtration through soil before discharge into the Thames Estuary. The island, which was separated from the mainland of Essex by Benfleet Creek, being 4½ miles from Southend, and well away from all residential properties, was free from any chance of nuisance. Its surface, which was 8 ft. above Ordnance datum, and 6 ft. 6 in. below the highest tides, was as flat as a table, not varying in height more than 12 in. throughout its entire length and breadth. It was at present surrounded by a sea-wall, 9 ft. or 10 ft. high, and there was room within that marginal bank, which formed the island into a monster basin, for the sludge of the whole of the sewage of the metropolis for two centuries to come, if no part of it were disposed of otherwise, without raising the accumulating solid matter above the height of the banks, whilst two-thirds of its extent, *i.e.*, 3,000 acres, would suffice for the treatment of the sewage for 100 years, if the deposit were raised only 100 in. That would leave one-third of the island to be converted into a sewage farm or planted with osiers, or otherwise dealt with, as might be found most advantageous. The soil of the island was alluvium on clay, and as there were no rocks nor stones in it to obstruct steam cultivation, it could be as readily rendered fit for filtration by stirring, trenching, and mixing as any land in the kingdom. It was singularly capable of both surface and under-drainage, owing to its insular character, low tide (neap) being 10 ft. below the surface, thus allowing the discharge from the under-drains to be constant by the construction of proper outfall channels connected with internal tidal ponds or reservoirs, which would empty their contents as soon as the tide receded. But the local features which most favoured treatment of the sewage on the island were:—1. That the alluvium would burn into ballast. 2. That under the surface and for a considerable extent there existed a clay-puddle technically termed "cement mud." 3. That on the shores surrounding the island there existed inexhaustible beds of very fine sea-sand and cockle-shell *débris*,—the best of filtering materials. 4. That on the opposite shore of the river (Kent) there existed chalk, which could be obtained at comparatively small cost, to be ground and used as chalk, or burned into lime if desired, as a precipitant and disinfector. 5. That within easy reach there existed on the River Medway the well-known cement works. The substances enumerated were specially valuable for mixing with the sewage to give it solidity, and for mixing with the soil to fit it the better for filtration and give that capability of percolation which might be found desirable. The island at present was used simply for agriculture, and having only 300 inhabitants upon it, with one small church, vicarage, schools, and village, all built of wood and easily removable, it presented the most inviting conditions for the utilisation of the sewage of the metropolis, seeing that whatever had been done elsewhere, and might be done in future with the advance of science, could be done upon the island without any nuisance whatever.

The Chairman proposed a vote of thanks to Mr. Bailey Denton for his most interesting and important paper.

Dr. Poore seconded the motion, which was agreed to.

Dr. Drysdale said he considered that Mr. Bailey Denton's scheme was conclusive as against the scheme of the Metropolitan Board of Works. The latter seemed to be in opposition to those schemes of physiological treatment which were being adopted in Paris, Berlin, and other Continental cities. It really appeared as if England would be behind rather than before the rest of Europe in regard to sewage treatment. The effect of Mr. Dibdin's plan would, he believed, be quite inappreciable, as no chemical product could have any effect in neutralising the injurious results of sewage in a large city like London. The only chance of dealing with the sewage of the metropolis was by what might be termed the physiological plan.

Dr. Alfred Carpenter said that the wasteful manner in which the Metropolitan Board of Works intended to deal with the sewage of London should call down shame upon that body. Mr. Bailey Denton's proposal to utilise Canvey Island for the disposal of the sewage commended itself as a sort of half-way house or compromise as between wide irrigation and chemical precipitation. Many people might be convinced that irrigation was the best way to utilise the sewage, while others might think it an unsatisfactory process, and attended with evil consequences. Therefore, until the majority came round to the view that sewage irrigation was a safety and not a danger, it was not likely to be generally adopted. If the Canvey Island scheme could show this it would have done a great work, and would be a step towards preventing the destruction of the trade of the port of London, which must come about if the present condition of things was to continue for another fifty years. The mass of material being deposited in the Thames was preparing the way for what would one day bring down a severe punishment. The Metropolitan Board might as well "spit in the sea" as use chemicals in the manner they propose doing. By the Canvey Island scheme there would be three or four thousand acres of land producing an increased amount of produce, and an enhanced milk supply for the metropolis.

Mr. Shone remarked that he had visited Canvey Island for the purpose of studying the "sewageology" of the place, because he understood that the proposal was to create land out of the *detritus* and other sewage matters to be conveyed there. He believed that the island would be a very suitable place for carrying out the scheme designed by Mr. Bailey Denton and Col. Jones, and it would be far cheaper in the end for the Metropolitan Board of Works to purchase the place as a site for a huge laboratory than to keep on conducting their experiments at the outfalls at Crossness and Barking.

Mr. Sillar, though a strong advocate for precipitation *versus* irrigation or intermittent filtration, did not think one word had been said too strong in denouncing the scheme of the Metropolitan Board of Works, taken as a whole. At the same time, there was something to be said for it. Mr. Bailey Denton appeared to assume that the Royal Commission had given an unqualified approbation to the scheme for conveying the sewage down to Canvey Island; but that was a mistake. What they had recommended was precipitation if possible, and to carry the effluent down the river. If, therefore, precipitation was to be adopted, it was not altogether foolish of the Metropolitan Board of Works to put up works for the purpose, and to delay the carrying down of the effluent water until they found it must be done. After having erected the tanks, if they found they could produce an effluent which might pass into the Thames, it would be a needless expense to erect a costly sewer to carry it further down the river. He must confess that he did not expect the Metropolitan Board to produce such an effluent by the proposed plan, although if they had adopted the Aylesbury scheme,—which, by the way, they did not understand,—there would be no necessity for any lengthened sewers. The Board would doubtless learn the best treatment of sewage by experience when the tanks were constructed, and they would thus save the expenditure of over three millions of money, with its burdensome interest, on an immense sewer, which in the end might be found to be unnecessary.

The discussion was continued by Dr. Poore and the Chairman, who supported Mr. Bailey Denton's views, while Mr. G. R. Strachan and Mr. Helmer took up a somewhat neutral position.

A vote of thanks to Professor Corfield for presiding closed the proceedings.

Royal Academy: Architecture School. The Modelling Class having terminated for the session, a course of demonstrations on "Mouldings and Profiling" will be given by Mr. Stannus, at six p.m. on Monday evenings, as follows:—April 18, Use and General Contour; April 25, Composition of Crown and Foot Mouldings; May 2, Composition of Framing Mouldings; May 9, Returns and Suppression of Mouldings; May 16 and 23, Enrichment of Mouldings; June 6, Profiling of Vase Forms; June 13, Profiling of Baluster Forms.

SANITARY LEGISLATION CONFERENCE.

The first meeting of this Conference was held at 5, Argyle-place, Regent-street, last week, when representatives were present from the following institutions:—Sanitary Assurance Association, Royal Institute of British Architects, Surveyors' Institution, Public Health Medical Society, the London Sanitary Protection Association, and the Association of Municipal and Sanitary Engineers and Surveyors, also Sir Henry E. Roscoe, M.A., and Mr. C. C. Lacaita, M.P., two of the members having charge of the Sanitary Registration of Buildings Bill. The representatives present included Lieut.-Gen. Lord Chelmsford, G.C.B., Sir Joseph Fayrer, K.C.S.I., M.D., F.R.S., Sir Vincent H. Kennett-Barrington, Mr. Edward I'Anson, President of the Royal Institute of British Architects, Professor T. Roger Smith, Mr. J. Lobley, President of the Association of Municipal and Sanitary Engineers and Surveyors, Mr. Timothy Holmes, F.R.C.S., Dr. David Finlay, F.R.C.P., Mr. Mark H. Judge, Mr. H. Rutherfurd, Mr. J. W. Penfold, Hon. Sec. of the Surveyors' Institution, Mr. Hugh Leonard, C.E., and Mr. E. B. Ellice Clark.

Sir Joseph Fayrer was elected President of the Conference, and the following vice-presidents were appointed:—Lord Chelmsford, Sir Guyer Hunter, M.D., M.P., Mr. Lacaita, M.P., Mr. Edward I'Anson, President R.I.B.A., Mr. J. Lobley, President of the Association of Municipal and Sanitary Engineers and Surveyors, and Mr. H. Rutherfurd. Mr. Joseph Hadley, F.S.S., and Mr. Mark H. Judge were appointed Hon. Secretaries.

Sir Joseph Fayrer, as President of the Sanitary Science Association, welcomed the representatives, and explained that the Conference had been convened by the Association on the suggestion of the Association of Municipal and Sanitary Engineers and Surveyors for the purpose of considering the Sanitary Registration and Buildings Bill, which had been introduced by Mr. Lacaita, at the request of the Sanitary Assurance Association, the second reading of which was fixed for the 22nd of June. The Bill had been prepared after most careful consideration by the Council over which he had the honour to preside. They were fully convinced that some measure of the kind was absolutely necessary in the interests of the public health, and they were glad to have been so fortunate as to receive the assistance which this Conference would give to sift the details of the Bill, so that their representatives in the House of Commons might be made aware of the provisions of the Bill, and of its bearing on the general health of the community, in order that the principle of the measure might be embodied in an Act of Parliament. He felt sure that however those present might differ with regard to the details of the measure, the principle of the sanitary registration of buildings would meet with their approval. In a meeting composed of eminent jurists, medical men, architects, and engineers, there was no need for him to speak at any length upon the necessity which existed for improvement in the sanitary conditions in which our people had to reside. It might be urged that Government already dealt with sanitary matters, and had taken charge of the sanitary condition of our towns; but that was only true to a very limited extent. Unless the authorities had reason to believe that a nuisance existed, he believed that there was no power under which public officers could demand admission to buildings for the purpose of sanitary inspection. By the present measure it was not proposed to give this power, but they did seek to impose upon the owners and occupiers of buildings used for public or semi-public purposes, the duty of satisfying the public sanitary authority that such buildings were in a satisfactory sanitary condition. In proposing that addition to our sanitary law, the Bill expressly provided that in no respect whatever would the powers and responsibilities of authorities under existing Acts be interfered with in the least.

Letters were read from some associations requesting to be permitted to send representatives to subsequent meetings of the Conference, but it was resolved for the present to limit the Conference to the institutions already represented, with the exception of the Institution of Civil Engineers, which it was decided to invite to appoint representatives.

The Conference then proceeded to consider the principle of the Bill, upon which Mr. H. Rutherfurd proposed,—"That the sanitary registration of buildings is desirable in the interests of the public health." This was seconded by Mr. Holmes, and supported by Mr. Robins, F.R.I.B.A.; Mr. Angell, Borough Engineer, West Ham; Mr. Ellice Clark, Mr. Judge, Professor Roger Smith, Sir H. Kennett-Barrington, and Mr. Lobley, and carried unanimously.

Mr. Lewis Angell proposed, "That it is desirable that the law should forbid any building being used for public or semi-public purposes, unless and until the arrangements for the water supply, drainage, and ventilation of such buildings have been certified as satisfactory by some properly qualified person." This was seconded by Lord Chelmsford, and, after considerable discussion, was carried unanimously.

Mr. Mark H. Judge proposed, "That the provision of a Public Sanitary Register for the voluntary registration of private houses would be instrumental in promoting Sanitary Improvement." Sir H. E. Roscoe, M.P., seconded, and this was also unanimously agreed to.

It was then proposed to consider the details of the measure by taking the Bill clause by clause, and for this purpose the Conference adjourned till April 18.

BUILDINGS FOR POOR LAW ADMINISTRATION.

Lambeth. — Early last year the Lambeth Guardians had seriously to consider the want of sufficient accommodation for the increasing number of inmates at their workhouse, Renfrew-road, Kennington-lane, and after much discussion it was eventually decided to reconstruct the old workhouse, Princes-road, and to transfer the whole of the able-bodied inmates thereto, leaving the aged and infirm at Renfrew-road. In accordance with that decision, the Princes-road workhouse is now being reconstructed, or rather virtually rebuilt, from the designs of Mr. T. W. Aldwinckle, F.R.I.B.A., accommodation being provided for 200 men and 150 women. The new workhouse (the foundation stone of which was laid on the 6th inst. by Mr. George Howlett, Chairman of the Board of Guardians) is to be a "test house," that is, an establishment where a rigid test of isolation and work will be applied to the able-bodied loafers of both sexes,—those who are perfectly able to earn their living outside the workhouse if they were willing to do so,—while the deserving poor will meet with every consideration. This desirable end will be arrived at by a strict system of classification, as already arranged by the same architect at the workhouse at Renfrew-road, and also at the new workhouse of the Wandsworth and Clapham Union. Each sex will be divided into three classes, according to conduct and antecedents, and this classification will be strictly maintained throughout by providing, for each class, distinct and separate day rooms, dormitories, staircases, airing yards, lavatories, baths, &c. This arrangement, while distinctly protective towards the deserving poor, will act as a great deterrent towards those of bad character, as it is found that strict discipline and isolation are very distasteful to the latter. For all three classes there will be ample opportunities for work, and no one will be allowed to remain idle. Those of the first class (good character) will be provided with associated workshops and workrooms of the usual description, but the remaining classes, comprising those of bad character, will perform their daily tasks in isolation, having no communication with each other. This separate system will, in exceptionally bad cases, be extended to the day rooms and dormitories. In order to ensure discipline, each ward is overlooked by a window in an officer's room, and, with a view to safe exit in case of fire, each large ward has a staircase at each end. Special attention has been paid to the warming and ventilation. The several wards will be warmed by hot-water pipes. For ventilation, fresh external air will be admitted by means of Tobin's tubes and Boyle's inlet brackets, and the vitiated air will be removed by means of vertical brick shafts, terminating with air-pump ventilators, the temperature of the interior of these shafts being raised by means of conical gas-burners. The drainage will be laid in straight lines from one manhole to another, and will have inlet and outlet ventilation, the latter by means of exhaust-shafts higher than the buildings. The drains will be flushed automatically. Great care will be taken to prevent sewer gas from entering the house. All soil-pipes will have air inlets near the foot, and will be carried up as ventilators above the roof. All waste-pipes will discharge into external traps, giving air-separation from the drains. Every part of the buildings will be of the plainest possible character,—absolutely devoid of all ornament,—and the internal finishings perfectly simple. The buildings will cost 20,000*l*. The contractor is Mr. William Smith, of Eldon Works, Kennington; and Mr. Chutter is the clerk of works. In addition to these works, the Lambeth Guardians, at their last meeting, instructed Mr. Aldwinckle to prepare plans for the enlargement of the Infirmary, Renfrew-road, by 250 beds.

St. George's-in-the-East.—The Guardians of the Poor of St. George's-in-the-East have instructed their architects, Messrs. Wilson, Son, & Aldwinckle, to prepare plans for extending and remodelling the casual wards upon the cellular system.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—The tenth ordinary meeting of this Association for the current session was held on the 5th inst. The Vice-President (Mr. John Cotton) was in the chair. A paper entitled "Notes on a Tour in Germany" was given by Mr. H. H. McConnal. The paper was illustrated by a number of very good pencil sketches by the author. A vote of thanks, proposed by Mr. W. Doubleday, and supported by Messrs. T. W. F. Newton, J. Cotton, A. V. Ingall, and Victor Scruton (hon. secretary), was heartily accorded to Mr. McConnal for his interesting paper, and after a response from that gentleman, the meeting terminated.

Edinburgh Architectural Association.—At the fortnightly meeting of this Association on the 7th inst., Mr. Hippolyte J. Blanc, president, in the chair, an interesting paper was read by Mr. G. Godfrey Cunninghame, advocate, upon recent discoveries made by him at Liberton House, originally known as Liberton Place, the ancient mansion-house of the Barony of Over Liberton, and the country residence for generations of the family of Little, now represented by Mr. Walter J. Little-Gilmour, of Lamberton and Craigmillar. Though not possessing many external features to attract the passer-by, the house, in spite of alterations and vicissitudes innumerable, remained a tolerably complete specimen of the domestic architecture of the early part of the seventeenth century, when it was no longer necessary to construct a fortalice to keep off foreign enemies, but when it was still advisable, from the unsettled condition of society, to be prepared against sudden attack by neighbouring marauders. The general plan of the main building was somewhat unique, and investigation has revealed quite an unexpected number of antique features, some of them of unusual interest, which had been for a long and unknown period concealed under lath and plaster and modern masonry. Particular attention was directed to the great fireplace which terminates the drawing-room, to the defences of what was originally the chief entrance of the house, and to the characteristic wall decorations, of which a few traces remain. The absence of any very remarkable associations, historical or romantic, was no doubt a reason why Liberton House had not hitherto attracted the attention of the architect or the antiquary. It, however, well deserved notice for the sake of the name with which it had been linked for so many generations. The Littles of Liberton were prominent citizens of Edinburgh in the seventeenth century. One of them, whose initials might be seen at Liberton, and whose sumptuous monument, with recumbent effigy, stood over the family burial-vault in Greyfriars, occupied the civic chair; and to the literary taste of another the University was indebted for the foundation of its library, a few hundred volumes bequeathed to it by Charles Little having been the nucleus round which it had since grown and flourished. It was to be hoped that the present laird, who had recently done so much to preserve the venerable walls of Craigmillar from sinking into hopeless decay, might see his way to restore, in some measure, Liberton House; or, at least, to remove the modern additions which disfigured the edifice without improving it as a residence. On the

conclusion of the paper, a vote of thanks was proposed by Mr. Thomas Ross, who expressed the opinion that Mr. Cunninghame had presented the profession with a most interesting, and until now unknown, study of an old Scottish mansion, and he hoped that both the fabric and its history would undergo exhaustive examination, with a view to the preservation and development of the ancient features that remain, in the prosecution of which objects, he said, the Association would willingly co-operate.—On Saturday last, under the leadership of Mr. Hippolyte J. Blanc, the members of the Association visited the castles of Duntarvie and Niddry. Mr. Blanc said that Duntarvie Castle, situated in the parish of Abercorn, though comparatively unknown, was interesting as an early example of the group of manor-houses classed in the fourth period of MacGibbon and Ross. The building was a long rectangle of about 80 ft. by 23 ft., and had winged extensions to the back at each end. Though not what one would now consider a commodious residence, for its time it was a compact and conveniently-arranged manor. Niddry Castle, in Kirkliston parish, was also described. It was, Mr. Blanc said, a fairly interesting relic of one of the earlier forms of castle structures found in Scotland. It had massive walls, pierced irregularly with small openings for light and observation, and it had also a corbelled parapet and an angle turret. As accounting for the late forms of detail that might be found on the fireplace jambs in the interior, it was recorded that on the 19th of January, 1570, in revenge for the assassination of the Regent Moray at Linlithgow, Niddry, among other neighbouring castles, was burned by the English army. Those features might, therefore, be the result of subsequent repairs. Mr. Blanc pointed out the architectural features of the castle, and at the close received the thanks of the company for his papers.

OBITUARY.

Mr. Alexander Bassett, C.E., of Llandaff, died on the 9th inst. The *Western Mail* says that he first suggested the advantages of a dock just outside Newport, and, with Mr. Abernethy, planned and carried out the Alexandra Dock, Mr. J. A. B. Williams, the present Water Engineer for the Cardiff Corporation, being the resident engineer and superintending the work as it proceeded. Mr. Bassett was the engineer for the Cowbridge Railway Company, and planned and laid down that line of railway from Llantrisant to Cowbridge. He held the office of County Surveyor for Glamorganshire for over thirty years, and when he resigned that appointment in 1885 his son, Mr. A. B. Bassett, was appointed his successor.

COMPETITIONS.

Lavenham Guildhall.—We hear that the successful competitor for the restoration of Lavenham Guildhall, in the competition advertised by its present owner, Mr. Cuthbert Quilter, M.P., for which he offered a premium of 25*l.*, is Mr. John S. Corder, of Ipswich.

Wesleyan Chapel, Helperby, near Ripon.—For this building, to cost 1,000*l.*, there were eight competitors. The design submitted by Mr. T. Butler Wilson, of Leeds, was selected.

COMPETITION FOR THE WEST FAÇADE OF MILAN CATHEDRAL.

SIR,—Referring to your paragraph on this great work in your last week's issue [p. 531], allow me to correct a little misconception. The authorities at Milan nominated at the outset three foreign architects as jurors,—namely, a German (Baron Schmidt), a Frenchman (Professor Dartein), and an Englishman (myself). Now the idea of your German correspondent is altogether excellent, but it would be a misfortune if, through ignorance of any of the above-mentioned appointments, any competitor's vote were thrown away upon those who are already appointed members of the selecting jury.

I would beg, therefore, while acknowledging my deep sense of the honour you have done me by suggesting me in conjunction with Mr. Pearson as jurors to be chosen by the competitors, that you should forthwith propose another name in place of my own.

ALFRED WATERHOUSE.

New Cavendish-street, April 13.

P.S.—I may mention that though the instructions allow the competitors to choose four jurors, only two are to be architects, the others being a painter and a sculptor.

*** Then we will beg to suggest Sir F. Leighton as the other name, if the idea of our German correspondent is carried out, about which we can say nothing. We were merely appealed to to assist in enabling him to carry it out, which we did as far as in our power.—ED.

THE VENTILATION OF SEWERS.

SIR,—Under the above heading you recently printed extracts from Professor Attfield's lecture,* and the suggestions there made should, I venture to think, receive the best attention of sanitary authorities.

Without discussing the assertion that the whole of the fresh air introduced for the purpose of ventilation becomes saturated with the vapour, there can be no doubt that the air, gas, or vapour proceeding from drains or sewers should be conducted to a point above the house-tops. It will also, I think, be admitted that sewers wherein men have to work must be provided with air.

The present method of putting an intercepting trap between the house-drain and the sewer is doubtless a wise one where the ventilation of drains is the exception rather than the rule, and is in self-defence, otherwise the ventilation of the sewer would also be carried out at those points; but if *every* house draining into a sewer were provided with an outlet vent-pipe at its highest point and carried above the house top, then I think the intercepting trap might be dispensed with, resulting in each house bearing its own share of ventilation of both drain and sewer. The gratings in the roads might then safely remain, and would become the inlets for air. Of course, in this case, inlets to individual drains would be unnecessary.

Under the present system, every house-drain will shortly be supplied with its interceptor, consequently the evils of the exhalations from the road gratings will increase. This was fully demonstrated last summer on an estate where the surveyor is exceedingly careful about the modern system of house-drainage. The stench from the gratings was horrible, and the houses had a very good chance of letting into their doors and windows the enemy they had striven at considerable expense to keep from passing through their pipes, for fear of doing a trifle more than their fair share of the common duty of carrying the foul vapour above the house-tops.

H.

KITCHEN BOILER EXPLOSIONS AND SAFETY VALVES.

SIR,—I thank Mr. Buchan and Mr. Crane for their letters, kindly printed by you at p. 551 of your last issue; they, however, both ignore the main question as to the desirability or otherwise of having any safety-valve at all. A safety-valve will not prevent the bursting of a boiler by the sudden irruption of water into it when the boiler is highly heated, and this is the most frequent cause of these explosions. For other purposes the benefits to arise from the use of a safety-valve are, in my opinion, more than counterbalanced by the inconveniences and dangers likely to result from it, as pointed out in my previous letter [p. 520, *ante*]. Is it best to fix such a valve or to dispense with its use?

Replying to Mr. Buchan, I may be permitted to mention that the hot-water system supposed in my letter did not refer to that in common use in the North, where the primary circulation is from the boiler to a hot-water tank in the kitchen, but to the system more usually adopted in London and the South generally, of the boiler at the bottom and a hot-water tank and feed-cistern at the top of the house, or, at any rate, above the highest draw-off. I am not interested in recommending one system as against the other, but take the usual arrangement I find nearest to me. By my third precaution I meant the word "tanks" to include this top hot-water tank as well as the cold feed-cistern, using the word in its dictionary sense as a "receptacle for water." I agree with Mr. Buchan as to the necessity for the hot blow-off pipe having a rise upwards in every part of its course, but my precautions were meant as recommendations to householders when they find their pipes frozen or otherwise blocked, and not as advice to engineers or plumbers in fixing the apparatus; and further, I had in my mind the London top hot cistern practice, where the relief pipe performs a different function to his blow-off pipe, and is almost always of short length, and quite perpendicular, and is merely a steam relief-pipe from the expansion space at the top of hot tank. Mr. Crane gives no opinion as to whether a safety-valve should be used, but advocates the return pipe as a proper part on which to fix one, on account of the lesser corrosion in that pipe. I, however, submitted that if such a valve be fixed at all, it should be on a separate short pipe from the boiler, in which pipe there should be no circulation, and consequently, practically no corrosion, or, at any rate, much less than in either the flow or return pipe. I agree with him that no good engineer thinks of putting a draw-off cock to a circulating boiler; but these hot-water circulations are so often fixed by those who are not as good engineers as Mr. Crane, that I recommended "never to have a draw-off tap in the boiler"; in effect, that where there were such taps they should be removed.

ROBERT WISTON.

* See p. 367, *ante*.

THRONDHJEM CATHEDRAL.

SIR,—In your report of a lecture at a recent meeting of the Edinburgh Architectural Association [p. 519], delivered by Mr. Scott Dalgleish on the above cathedral, I see him stating that the name Throndhjem (it should be spelt with an *h*) was derived from the German word "Drontheim," as signifying "Throne-home." This is doubly incorrect, there being no such word in German, and the name signifying the "Home of the Thrönder," *i.e.*, the exact name given till this very day to the dwellers in Thröndelagen, viz., the district around the Throndhjem's Fjord, these forming, at the time when this city was the most important in Norway, the "backbone of the country."

I always understood that the name Drontheim was a distinct *English* denomination. I ought also to add that the original name of the cathedral was "Nidaroo" cathedral, this being the name of the city down to the fifteenth century. Finally, I may say that the work of restoration is greatly attributable to King Oscar, who devotes particular attention thereto, and has already given a large sum of money towards it.

CARL SIEWERS.

PROVINCIAL NEWS.

Bath.—The Sanitary Committee of the Bath Town Council has lately been considering a long report from the Abattoir Committee recommending the erection of buildings covering three-quarters of an acre, and consisting of five slaughter-houses for beasts, sheep, and calves, with lairage; one slaughter-house for pigs, with lairage; one cooling-room for pigs; cooling-room adjoining slaughter-house for beasts and sheep; a manager's house, a house for blood and offal tubs; a boiler for hot water; two or three pens; a receptacle for dung, and proper sanitary conveniences for men using the premises. The estimated cost, exclusive of land, is 3,000*l.* No decision has yet been come to on the subject, but the report was ordered to be printed and circulated. The butchers are up in arms against the project.

Cheadle.—The Cheadle and Gatley Local Board having applied to the Local Government Board for permission to borrow 1,400*l.* for the purpose of providing offices for the local board and a town's yard, an inquiry was recently held by Major-General Phipps Carey into the scheme, to which there was no opposition. The Clerk stated that the rateable value of the township was 56,855*l.*, the population 7,336, and the area 5,818 acres. The township had no debts under the Sanitary Act.

Coventry.—At a recent meeting of the Coventry City Council, a draft deed of conveyance by Mr. David Spencer to the Corporation of property situate at No. 38, Earl-street, was sealed. The property is conveyed to the Corporation in perpetuity "upon trust that the said hereditaments and all buildings now standing and hereafter erected thereon shall be and for ever remain dedicated, used, and enjoyed for technical schools and schools of science, especially the sciences applicable to industry and manufactures, and so far as at any time not wanted for such schools for any other of the institutions contemplated and provided for in and by the Public Libraries (England) Acts, 1855 to 1884, and to be so used and enjoyed either gratuitously or on payment by the persons using the same, of such fees for admission or subscriptions as may from time to time be appointed by the Corporation, so that the said fees and subscriptions be expended in the maintenance and reparation of the said buildings, and the providing of custodians, tutors, apparatus, furniture, materials, and things in and for such schools or institutions some or one of them." The thanks of the Council were voted to Mr. Chadwick for his gift.

Hull.—The new "Globe Warehouses," a large block of buildings erected in High-street by Messrs. Bilton & Co., at a cost of upwards of 30,000*l.*, have lately been opened. The new

buildings have been erected on a site upwards of three-quarters of an acre in extent, which includes the whole area between High-street, Chapel-lane Staithway, Oriel Staithway, and the River Hull, with the exception of the two blocks of offices at the corners of the High-street frontage. The buildings comprise three separate warehouses, divided by areas open to the sky for light and ventilation, and communicating only on the ground-floor by double iron doors. The north warehouse is 40 ft. in width, and extends from the river to the back of Oriel-chambers; the south warehouse is also 40 ft. in width, and extends from the river along Chapel-lane Staithway to the back of the offices fronting High-street; while the centre warehouse is of an average width of 70 ft., and extends from the river to High-street. All the buildings are five stories in height, the floors being supported by cast-iron columns with grooves in the sides to admit of the several floors being divided up into bins by division boards. Two inside staircases lead from the ground-floor to the first floor, but above this level all the floors are reached by two iron staircases on the river front placed entirely outside the building; this arrangement is of great advantage in point of protection against fire, as direct communication between the warehouses and openings in the floors is thereby avoided. All three warehouses have a frontage to the River Hull, and the topmost floor across this frontage is considerably higher than elsewhere, so as to accommodate the hopper and band machinery in this part of the building. The machinery consists of cranes for discharging barges lying alongside the wharf, and "carriers" for distributing the grain over the floors of the warehouse. The cranes, of which there are three (one to each warehouse), are worked by hydraulic power on the high pressure or "accumulator" system introduced by Sir William Armstrong. They are fixed on the outside of the building, and constructed to make a lift every minute, and as the jibs are of great length, and are fitted with hydraulic lifting or "topping" gear, they will command a double tier of barges lying alongside the quay. The grain is lifted in Priestman's "grab" buckets, holding 3½ quarters of wheat, and discharged into hoppers in the roof, at a height of about 70 ft. above the quay. The buildings have been designed by, and carried out under the superintendence of, Messrs. Botterill, Son, & Bilson, architects, Parliament-street, Hull. The whole of the works have been executed by Messrs. George Jackson & Sons, contractors, of Witham, Hull, except the cast-iron columns, which were supplied by Messrs. King & Co., Limited, of Hull. Mr. W. Gravell has been the clerk of works. The crane and band machinery has been designed and executed by Sir W. G. Armstrong, Mitchell, & Co., of Elswick Works, Newcastle-on-Tyne.

Leek.—At the Town-hall, Leek, on the 31st ult., Mr. J. T. Harrison, C.E., one of the Local Government Board's inspectors, sat for the purpose of receiving evidence relative to the extension of the gasworks, cemetery, and Town-hall. The first part of the inquiry was with respect to repealing and altering the Leek Improvement Act, 1855, by means of a provisional order, so as to enable the Commissioners to extend the area of the gasworks from two acres to four, and to borrow 1,500*l.* for the purpose. There was but little opposition to this proposal. Then came the question of enlarging the acreage of the cemetery from seven to twelve, and a similar consensus of opinion was elicited. With regard to the extension and alteration of the Town-hall, however, there was strong opposition, about half the Board itself protesting against the proposals made. The relative merits of three sets of plans, prepared respectively by Mr. Waterhouse, Mr. J. W. Critchlow (Leek), and Messrs. Sugden & Son, also of Leek, were discussed at length. The first, which had been adopted by the Board by a majority of one, was characterised as costly and unsuitable; Mr. Critchlow's met with some favour owing to its simplicity and economy; and that of Messrs. Sugden was generally approved as being calculated to remove at a moderate cost some of the defects of "the most defective room in the county." Mr. Harrison, after patiently listening to those who opposed the decision of the Commissioners, said he should advise the purchase of the adjacent property at a cost of 1,000*l.*, and recommended the Board to reconsider the plans, and make a fresh application to the Local Government Board. He thought the plan of the Messrs. Sugden was a good one, inasmuch that it dealt effectively with a staircase which could not fail to prove highly dangerous in the event of fire or panic.

CHURCH-BUILDING NEWS.

Begelly (near Tenby).—On the 27th ult. Begelly Church was reopened, after restoration. The architect for the work was Mr. Bruce Vaughan, of Cardiff, and the contractors were Messrs. George Watkins & A. Davis, Begelly, the amount of whose tender was 964*l.*

Belfast.—Windsor Presbyterian Church, Belfast, was opened on the 27th ult. It occupies an elevated site at the junction of Derryvolgie-avenue with the Lisburn-road. The plan comprises a nave with transepts. At the rear, the session room, ladies' room, ministers' room, and large class-room, approached by a small staircase, with lavatories, &c., form a distinctive group. The main entrance is situated opposite to Derryvolgie-avenue. The principal feature is the tower, placed at the north-west angle of the church, terminating in an octagonal spire and vane rising to a height of 160 ft. The church is pewed to a accommodate 520 persons on the ground-floor, and 145 on the gallery. The heating is effected by hot water, carried out by Messrs. Riddel & Co.; the lighting by gas pendants, by Mr. J. Dowling; the stone carving by Mr. J. Malcolm, and the upholstering work by Mr. J. C. Mayrs. The general contractor was Mr. R. Corry, and the architects are Messrs. Young & Mackenzie. The cost of the church, enclosing walls, &c., will be about 6,700*l.*

Boroughbridge.—St. James's Church, Boroughbridge, was reopened on Sunday last, after redecoration, which has been carried out by Mr. Knowles, of York.

Cardiff.—A meeting of the congregation of St. Catherine's Church, Cardiff, has been held for the purpose of considering the best means of raising the funds necessary for the completion of the church. The building was to have cost 8,000*l.*, 3,250*l.* of which has already been expended in the construction of the nave, and there remains the east portion of the church, consisting of the chancel, transept, vestry, and organ-chamber, also the greater part of the west portion, to be built before the church is completed, the erection of which it is estimated will cost 5,000*l.* The architect is Mr. Kempson, the diocesan architect.

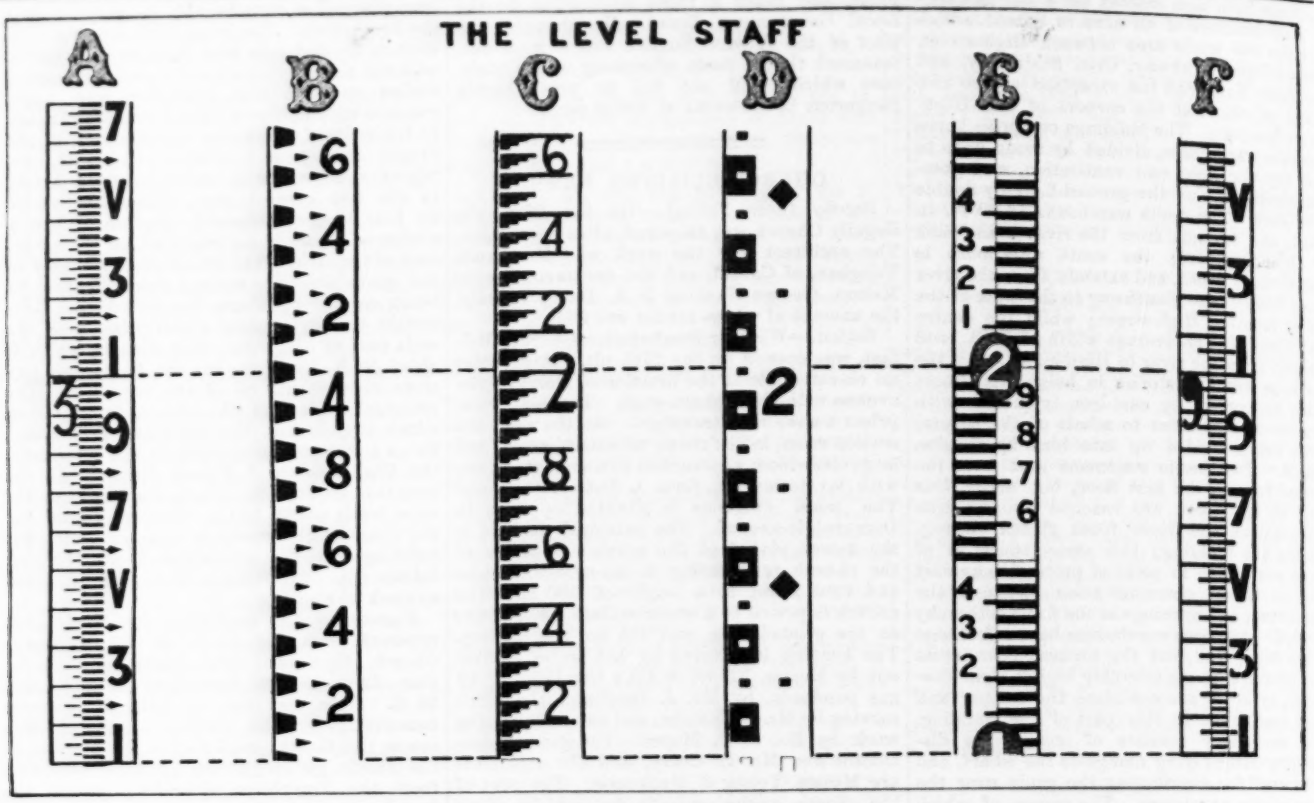
Clerkenwell.—The exterior of St. John's Church, Clerkenwell, has recently been renovated, from the designs and under the supervision of Mr. John Oldrid Scott, F.S.A., acting under whose direction Mr. Harry Hems, of Exeter, was commissioned to execute a sculptured panel over the western entrance to the church. The panel is in fine-grained wood, and the sculpture is in bold and high relief. In the centre is seen St. John the Almoner, the patron Saint of the Knights of St. John; he is seated, and wears an eastern mitre, which might readily be mistaken for a diadem. He carries the double or patriarchal cross, and is in the act of dispensing alms from an open money-bag. St. John the Evangelist sits upon his right hand, with a chalice (out of which a serpent is issuing) and the eagle by his side. On the north side John the Baptist is seated, clad barely in camel-skins, and bearing and holding a pilgrim's staff. Behind the figures, and at either end, are palm trees, and the heads of the two outside statues are surmounted by *nimbi*.

Peebles (N. B.).—The new Parish Church of Peebles was opened on the 24th ult. It has been erected, at a cost of about 10,500*l.*, during the past two years on a commanding site at the head of High-street, which was occupied by the former church. The church, which contains upwards of 1,200 sittings, has been erected from the designs and under the direction of Mr. William Young, architect, London. It is of stone both outside and inside, and is designed in the style of the thirteenth century period of Gothic of the Scottish type. It is about 118 ft. in length by 63 ft. in width, and is composed of nave, north and south aisles and chancel, with entrance lobby and staircases extending the whole width of the church on the east. A spacious vestry or session-house, which communicates with the chancel, has been added at the north-west corner of the church, and has been planned so as to be able to accommodate the Presbytery. The nave, 85 ft. long by 31 ft. wide, is divided into four bays, and connected with the aisles by arcades of four large pointed arches on each side, springing from stone columns with richly-moulded capitals and bases. In the walls of the aisles, opposite each of the arcade arches and central therewith, are triplet windows, with richly-traceried heads, to the two central bays, which are varied by four lancet windows in the two end bays, similar windows being repeated on the return wall of the aisle. The two central windows of the south aisle are made a special feature by being carried up above the gallery, and form double transept gables intersecting with the main roof of the nave. The chancel, which is about 28 ft. by 21 ft., has the floor raised two steps above the level of the nave floor. The principal feature of the church is the tower, which is placed at the south-east corner, and forms a picturesque addition to the view from the High-street and Tweed Bridge. At the base it is about 20 ft. square, the height to the vane being about 120 ft. The contractor for the whole of the works in connexion with the building was Mr. Alexander White, builder, Edinburgh. Mr. William Fox, Peebles, acted as clerk of works.

Plymouth.—The scaffolding has lately been removed from the tower of St. Matthias's Church, Plymouth. The tower measures on plan 22 ft. square from wall to wall, and 32 ft. from buttress to buttress, extreme measurement. The walling-stones of this tower, like the material used in the erection of the fabric generally, are of blue limestone from the Pomphlete Quarries; whilst the dressings in the main are of brown-bed Portland stone. Messrs. Hine & Odgers, the architects of the new church, chose the Perpendicular period of Gothic for the style in which to design the church. Each angle of the massive parapet is surmounted by lofty crocketed octagonal pinnacles, from the bases of which spring a number of lesser pinnacles, also crocketed. In the centre of the parapets, on all four sides, are slender pinnacles boldly carved and of graceful form. The belfry windows are double ones, each 25 ft. from sill to head. The higher parts of these are filled with tracery, whilst the louvre panels between the mullions are carved with open work. Lower down, the buttresses break off with carved pinnacles, and the turret at the north-east corner of the tower makes a pleasing and piquant break to the formal outline of the erection generally. Mr. Weymouth, clerk of works, has superintended the course of the building, stone after stone, as the representative of the architects' and building committee. Messrs. J. Finch & Son, builders, of York-street, Plymouth, have erected the tower, and are also carrying out the building of the church. The whole of the stone carving and sculptural work upon the tower and upon the church generally is by Mr. Harry Hems, his foreman of carvers being Mr. George Edmed.

Streatham.—On the 2nd inst. a new church in Streatham Park, dedicated to St. Alban, was consecrated by the Bishop of Rochester. It is built in the Romanesque style, from designs by Mr. Edward H. Martineau, of Weymouth-street. It is faced inside and out with red bricks, the columns, dressings, &c., being of red Newbiggen stone. There is a substantial open-timbered roof covered with Bracknell red tiles. The floors of the nave, &c., are paved with Gregory's wood blocks, and that of the chancel with mosaic. Messrs. Haden & Son, of Trowbridge, have carried out the heating, and Messrs. Strode & Co. the gas lighting; the general contractors being Messrs. Gregory & Co., of Clapham Junction. The cost of the portion of the building erected is about 6,500*l.*

The Taylor Art Scholarship, Dublin.—The *Freeman's Journal* reports the result of the competition for this scholarship, and says that the scholarship and prizes are derived from the income arising from the sum bequeathed by the late George A. Taylor for the promotion of art in Ireland. They are open to all Irish students not exceeding twenty-five years of age, who shall have attended twelve months at least a school of art. The scholarship has been awarded to Mr. Henry Stein Cairnes for a painting which he has named "The Model."



Various Forms of Level Staff.

The Student's Column.

FIELD WORK AND INSTRUMENTS.—XVI.

Surveying Instruments.

IX.—THE THEODOLITE (*continued*).

IN the methods described as (*a*) and (*c*) two distant points or stations are required. The points ranged by method (*a*) are both in front of the instrument, and the angle between their directions is observed before and after reversing the telescope upon its trunnion axis, and after traversing the body of the instrument half round upon its vertical axis with the vernier plate clamped. In method (*c*) the points ranged are upon opposite sides of the instrument. If the surveyor is satisfied that the trunnion axis of the telescope properly reverses over the vernier plate when the latter is set level, and that the vertical capstan-headed screws in the diaphragm plate need no adjustment, then it is not necessary for the two objects viewed to stand upon the same level. In method described as (*b*) a single station, at as great a distance as possible, is sufficient. The line of collimation is set upon the point selected, and the readings upon the vernier plate are taken both before and after reversing the trunnion axis or traversing the telescope round vertically end for end, but instead of the body of the instrument being traversed half round, as in methods (*a*) and (*c*), the vernier plate is traversed half round from the position shown in fig. 39 to the position shown in fig. 40 (page 522, *ante*).

The accuracy of the azimuthal axis may be further tested by turning the vernier plate 90° upon its vertical axis, or one-quarter round backwards and forwards, so that the telescope may be over the other parallel plate screws marked Z Z, the centre line joining which is at right angles to the centre line U U, joining those over which the instrument has been tested (see figs. 3 and 4, page 370, *ante*).

The measurement of horizontal angles being the most important function of a theodolite, it is best to adjust the collimation first for horizontal planes and the measurement of vertical angles; then, secondly, for vertical planes and the measurement of horizontal angles. By this means the telescope will remain finally adjusted under conditions in which it is most generally employed.

In order that the telescope may traverse a vertical circle and its line of collimation set out vertical angles or find any number of points in a vertical plane, it is necessary that its trunnion axis should be truly horizontal. It will be observed in fig. 39, which represents a transit instrument, that one end of the trunnion axis of the telescope, where it rests in the Y's, is arranged with an adjustable block. This block which is technically called a slipping-piece, is raised or lowered by turning the capstan-headed nuts attached to its screw connexion with the upright marked E. A long and sensitive spirit-level, marked H in fig. 4, is placed transversely, spanning the instrument from one trunnion bearing to the other. The feet of the standards to this level are formed of two inverted V-shaped notches filed where they rest on the trunnion as shown in fig. 3. The telescope is placed diagonally over the parallel plate screws U U, and the instrument set up level. The spirit bubbles Q and T will then be in the centre of their run. To adjust the horizontality of the trunnion axis the spirit level H is first placed upon the trunnion bearings and set level if it appears out of the centre of its run, by its under parallel plate-screws marked Z Z. It is then lifted carefully off and reversed end for end upon the trunnion bearings. A small wooden handle, omitted in fig. 4, is often attached to the centre of this level at H to prevent the heat of the hand affecting the bubble when touching it. The bubble tube being properly graduated, it is at once seen if the bubble remains in the centre of its run. If it deviates when reversed, half the error must be corrected by means of its own capstan-headed adjustment screws and half by the two parallel plate-screws beneath it marked Z Z. The trunnion axis will then be parallel to the run of this level marked H, when it is set level, but in adjusting it for reversion the vernier plate as indicated by the spirit-levels Q and T may have been thrown out of level. The next step, therefore, will be to reset the spirit levels Q and T in the centre of their run by working the parallel plate-screws U U, and Z Z, then raise or lower the slipping-piece in the upright marked E until the bubble in the axis level tube marked H is in the centre of its run. By this means the trunnion axis can be set parallel to the level of the vernier plate, when it will be at right angles to the vertical axis of the instrument, and is thus finally adjusted for reversion.

After the preceding operation has been gone through, set the index of the verniers upon the vertical arc to zero, fix the clamp M, and level the bubble on the telescope by means of the adjacent screws marked L L in figs. 3 and 4. Make the bubble reverse by traversing the horizontal vernier plate half round the vertical axis, and adjust half any error that may exist by means of the screws L L, and the remaining half by means of the capstan-headed screws which connect the longitudinal bubble to the telescope. Having done this, unclamp the screw M and point the telescope to some well-defined distant object. Take the angle of altitude or depression of this object, after clamping the arc and bisecting the object viewed with the cross hairs by means of the tangent screw J to the vertical circle. Then reverse the telescope in the Y's, and revolve the instrument half round horizontally. Repeat the operation of again setting the vertical arc to zero, and level the bubble by the screws L L (fig. 3). Set the telescope upon the point in the object first ranged, and if the vertical angle is found to be the same in both positions, no adjustment of the vertical collimating screws will be necessary, but if the first and second readings do not coincide, set the verniers to the mean angle, taking care all through that the axis bubble H appears perfect, and move the vertical screws upon the diaphragm plate until the intersection of the cross wires accurately cuts the distant point employed for the purpose. If preferred, a distant point upon a level with the line of collimation when the verniers on the vertical arc read zero and the longitudinal spirit bubble is set in the centre of its run may be used for the purpose instead of a point above or below the horizon.

X.—THE LEVEL STAFF.

Before proceeding to describe the optical instruments employed for taking levels, it is necessary to be acquainted with the level staff, by means of which heights are read. Six different kinds of graduations are illustrated in our diagram. The vertical distance between the two horizontal dotted lines indicates a height of one foot decimally divided. By placing a straight edge across in any position parallel to these dotted lines the reader will be able to compare the patterns A, B, C, D, E, and F, and to select the one he would prefer for use in the field.

Romford.—The new Post-office here is nearly completed, and will shortly be opened for business. It is situated on the west side of South-street, and has a frontage of 51 ft. The front elevation is faced with red bricks, the style adopted by the architect being a modification of what is popularly known as "Queen Anne." The building has been erected for the architect, Mr. E. Clerk Allam, of Romford, by Mr. H. Booth, the plumbing and decorating being carried out by Mr. A. T. Yull. The office fittings have been made by Messrs. Hammond & Sons.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

15,203 Sash Pulleys. W. T. Kellogg.

The improvement which is the subject of this invention consists mainly in giving a curved shape to the pulley-socket, so that it may be driven into the opening made in the wooden frame by a series of auger-holes. Spikes or projections are made or cast upon the pulley-boxes, so as to aid the fixing of the same in the window-frame.

15,552, Roofing Tiles. H. W. Lowden.

According to this invention, a double clip or clips is formed upon the back of the tile, which fixes upon the tile lath, and secures the same against falling off.

5,241, Soil-pipes. W. Cheal.

By this invention a counter-sunk hole is made in the floor of the water-closet, and a coupling hoop of lead is then affixed and beaten in so that the leaden soil-pipe is joined to the earthenware closet-pipe. Putty is sometimes used for additional security in making the joint, which in every case is made effectually water and gas tight.

273, Corner Clamps. J. Scherbel and T. Remus.

According to this invention, clamps are made with serrations or teeth in such form as that when bent on the corner of a frame the direction of the angle of the teeth shall be against the outside of the frame, and all is held together quite securely.

431, Nail-driving Appliance. J. B. De Forest.

The subject of this invention consists of a kind of magazine containing a supply of nails, which are driven downwards by every stroke or concussion of the whole machine. When a nail is driven home, the supply is cut off, only to begin further operations in an exactly similar manner.

1,193, Ventilators. W. Eckstein.

This invention is claimed to be an improvement on what are known as "Sheringham's Ventilators." Here the ventilators are made right or left handed, as desired, and a weighted flap is hinged to the casing, as is also the box or door of the ventilator. The improvements are in the direction of economy in the cost of manufacture, and in providing an easier method of opening and closing the apertures.

781, Ornamenting Ceilings, Walls, &c. H. McDonnell and others.

The object of this invention is to provide an unbroken material for walls, &c., by the use of paper or such like material. The paper is softened by moisture, and when applied in this state to the walls it is worked into the figures and patterns by the fingers of the operator or by suitable tools, thus forming one unbroken covering.

NEW APPLICATIONS FOR PATENTS.

April 1.—4,855, W. and N. Haigh, Flooring Cramp.

April 2.—4,909, A. Nicholas, Door-bells, &c.—4,917, W. Hawkins and Others, Axle Pulleys for Window sashes, &c.—4,927, J. Wilson, Street Paving.—4,937, A. Boult, Drain Traps.

April 4.—4,985, J. Thompson, Combination Range.—4,997, F. Pontifex, Draught Preventer, &c., for Doors and Windows.

PROVISIONAL SPECIFICATIONS ACCEPTED.

1,615, A. Edmeades, By-way Cock for connecting House Service-pipes to Water Mains.—2,657, R. Grocott, Fastening Knobs to Spindles.—2,785, W. Gaultier, Stop Blocks for Doors, Gates, &c.—3,329, T. Arrol, Trough Decking or Flooring for Bridges and Structures.—3,348, S. Proctor, Keyhole Escutcheons.—3,406, F. Cox, Fastenings for Sashes, Casements, &c.—3,470, W. Moore, Preventing Water-pipes from Bursting.—4,327, C. Henderson, Construction of Chimneys Inside Buildings.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

5,969, J. Rainer, Ventilator and Chimney Cowl for Extracting Foul Air and Smoke from Buildings.—7,518, P. Gay, Sawing, Cutting, Dressing, or Polishing Stone, Marble, &c.—7,811, H. Haddan, Lifts.—10,670, E. Edwards, Iron Girders for Buildings.—1,759, C. Ford, Surface Tiles for Walls, Partitions, Ceilings, and Floors.—3,296, J. Taylor, Chimney Pots.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

April 4.

By E. Robins & Hine.

Hampstead-road—No. 24, freehold £1,850

By Reynolds & Eason.

Battersea—8, Cairns-road, freehold 300

By W. T. Marsh.

Kensington — 37, Pembroke-square, 35 years, ground-rent 9*l.* 10*s.* 550

By G. A. Bickerton.

Kentish Town—10 to 16 even, Castle-road, 48 years, ground-rent 25*l.* 925

Raynes Park—A plot of freehold land 25

April 5.

By Walker & Runtz.

Mile End—51, Bancroft-road, 62 years, ground-rent 4*l.* 360

By Norman & Son.

Bromley—9 to 15 odd, Burcham-street, 81 years, ground-rent 16*l.* £480

By A. Booth.

Camden-road — 58, Hilldrop-crescent, 52 years, ground-rent 8*l.* 540

Holloway—555, Caledonian-road, 55 years, ground-rent 8*l.* 400

By W. W. Jenkinson.

Brighton—29A, 30, and 31, Richmond-buildings, freehold 900

Hendon, Springfields-road—The freehold house, Fairfield 1,400

New Cross—20, Ashmead-road, 80 years, ground-rent 4*l.* 5*s.* 285

1 to 4, Drysdale-road, 65 years, ground-rent 12*l.* 640

11 and 12, Drysdale-road, 65 years, ground-rent 6*l.* 335

3 to 8, Glenville-grove, 78 years, ground-rent 18*l.* 10*s.* 630

By Morley & Letts.

South Kensington—191, Earl's Court-road, freehold 1,500

Chelsea—5, 6, and 7, Hobury-street, 57 years, ground-rent 15*l.* 1,150

April 6.

By — Mitchell.

South Hackney—15 and 17, St. Thomas's-terrace, 54 years, ground-rent 9*l.* 610

By Harman Bros.

Kentish Town-road—Nos. 112 to 118 even, and three shops in rear, 78 years, ground-rent 160*l.* 5,000

Balham—98, Fernlea-road, 86 years, ground-rent 6*l.* 6*s.* 320

By Wells & Read.

Dunton Green—Ground-rents of 10*l.* 10*s.*, reversion in 96 years 220

By H. A. Cox.

Bermondsey—7 and 9, Yalding-road, 47 years, ground-rent 8*l.* 510

Horselydown—18 to 36 even, Boss-street, 39 years, ground-rent 90*l.* 920

7, 8, and 9, Kinross-street, 28 years, ground-rent 9*l.* 435

Bermondsey—110 to 118 even, Rolls-road, 46 years, ground-rent 16*l.* 10*s.* 615

By Giblin & Child.

South Norwood—Bickton House, freehold 280

By Messrs. Trollope.

Westminster—24, Marsham-street, freehold 750

36 and 37, New Peter-street, and a cottage, freehold 750

Romney-street—Ground-rent of 50*l.*, reversion in 34 years 1,500

Tufton-street—Ground-rent of 25*l.*, reversion in 78 years 630

65, Tufton-street, and 9, Little Tufton-street, and The Two Brewers public-house, freehold 2,620

1, 2, and 3, Little Tufton-street, 67 to 79 odd, Tufton-street, 62 and 64, Romney-street, and 1 to 4, Lane's Cottages, freehold 4,290

40 to 46 even, Horseferry-road, 39, Romney-street, and 1 to 5, Carpenter-street, freehold ... 3,550

48, 50, and 52, Horseferry-road, and 8 to 12, Carpenter-street, freehold 2,690

MEETINGS.

Monday, April 18.

Royal Institute of British Architects.—Business meeting to consider Schedule of Professional Practice and Charges of Architects. 8 p.m.

Surveyors' Institution.—Adjourned discussion on the paper by Mr. Wheeler, Q.C., on "Dilapidations and the Legal Obligation to Repair," and on the paper by Mr. P. E. Pilditch, entitled "Notes on Dilapidation Practice." 8 p.m.

Sanitary Legislation Conference.—2 p.m.

Victoria Institute.—8 p.m.

Tuesday, April 19.

Institution of Civil Engineers. — Papers by Messrs. Grover, Fox, Stooke, and Matthews on "Water-Supply from Wells, in the London Basin, at Bushey (Herts), in Leicestershire, and at Southampton." 8 p.m.

Society of Arts (Foreign and Colonial Section).—Major-General Sir Charles Warren, G.C.M.G., on "South Africa." 8 p.m.

Royal Institution.—Dr. John Hopkinson, F.R.S., on "Electricity." 3 p.m.

Parkes Museum (Lectures for Sanitary Inspectors).—Captain Douglas Galton, F.R.S., on "Ventilation, Measurement of Cubic Space, &c." 8 p.m.

Statistical Society.—Mr. N. A. Humphreys on "Class Mortality Statistics." 7·45 p.m.

Birmingham Architectural Association.—Open meeting. 7·30 p.m.

Wednesday, April 20.

Society of Arts.—Mr. A. Reckenzaun on "Electric Locomotion." Mr. W. H. Preece, F.R.S., in the chair. 8 p.m.

London and Middlesex Archæological Society. — Mr. F. G. Hilton Price, F.S.A., on "Cornhill and its Vicinity." (Geological Museum, Jermyn-street, 8 p.m.)

British Archæological Association.—Dr. J. Harker on "The Consecrated Well on Lancaster Castle Hill." 8 p.m.

Royal Meteorological Society.—Four papers. 7 p.m.

Thursday, April 21.

Society for the Encouragement of the Fine Arts.—Dr. Phené, F.S.A., on "Art in Scandinavia." 8 p.m.

Parkes Museum of Hygiene. — Mr. Alfred Fryer on "Dust and Ashes, and how to deal with them." 5 p.m.

Royal Archæological Institute.—(1) Mr. J. P. Harrison on "Pre-Norman Remains in England." (2) Mr. J. P. Harrison on "Some Celts of Chinese Jade recently found in America." 4 p.m.

Friday, April 22.

Architectural Association. — Paper by Mr. George Aitchison, A.R.A., entitled "Stray Thoughts on Architectural Education." 7.30 p.m.

Royal Institution.—Sir Frederick Abel, F.R.S., on "The Work of the Imperial Institute." 9 p.m.

Parkes Museum (Lectures for Sanitary Inspectors).—Dr. Louis Parkes on "Water Supply, Drinking Water, Pollution of Water." 8 p.m.

Saturday, April 23.

Edinburgh Architectural Association.—Visit to Dirleton Castle.

Miscellanea.

Decay of the South Staffordshire Iron and Coal Trades.—The *Staffordshire Advertiser* says:—Mr. John W. Sparrow, the well-known ironmaster, of Bilston, has this week published a letter on the subject of the local iron trade, which will excite considerable interest throughout the Black Country, if not, indeed, throughout a much wider area. Mr. Sparrow states that he has known Bilston for nearly seventy years, and for nearly half a century he has been actively engaged in business there. For the greater part of that long period he has been distributing in the shape of wages the large sum of 50,000*l.* a year. Now, however, his mines are closed and his only remaining blast furnace is about to cease working. Twenty years ago, within a three-mile area of Wolverhampton, there were forty-seven furnaces in blast. Now there is only a solitary furnace blowing, and that is the furnace which Mr. Sparrow finds himself reluctantly compelled to close. This state of affairs is of the most serious import to South Staffordshire, and, indeed, to the country at large. Mr. Sparrow attributes the altered condition of affairs to the "eight hours" system adopted by the miners, but for which he declares that his now drowned-out mines would have enabled him and his successors to have carried on the works for another fifty years, but he adds "short hours and great wages have converted what was a profitable business into a heavily losing one, and I can stand it no longer." Without expressing any opinion as to the conclusions arrived at by Mr. Sparrow respecting the cause of the prevailing deplorable state of the South Staffordshire iron trade, the facts cited in his letter are of the gravest import, and demand the serious attention of those more immediately concerned. It would, we think, be wise for employers and employed in the coal and iron trades to meet in friendly council, and endeavour to find some solution for a condition of affairs which threatens almost ruin to the staple industries of the Black Country, the lurid glare of whose furnaces was once proverbial. Those furnaces have now become, in the majority of cases, relics of a decaying industry, and have the appearance of so many miniature "extinct volcanoes," whose gloom and silence proclaim with thrilling effect the want and misery which must be the inevitable result of so many thousands of workpeople being reduced to a state of enforced idleness.

The Strike in the Building Trade at Birmingham.—This strike, mentioned by us last week, still continues, but just as we go to press a meeting of the Birmingham Master Builders' Association is being held to consider a suggestion from the Carpenters and Joiners' Association that Dr. Langford should be joined with the Mayor in selecting a person to officiate as arbitrator in the dispute. On behalf of the masters it is pointed out that although there are several branches of operatives, comprising masons, bricklayers, plumbers, painters, carpenters, &c., the carpenters are the only body who have made any distinct advances towards a settlement by arbitration, and that any agreement to be satisfactory must be common to the whole trade. There does not appear to be any indisposition to accept the suggestion that Dr. Langford and the Mayor should jointly nominate an arbitrator. It is officially stated that there is no truth in the assertion that a number of the members of the Master Builders' Association have left the Association since the commencement of the present dispute, or that they are acting at variance with the Association. Mr. Bigwood, the employers' secretary, writing in defence of the action taken by the master builders, states that "in October last, when trade was very bad, and before there was any talk of improvement or of Jubilee erections, they gave the operatives notice of 1d. per hour reduction. Taking these facts into consideration, in conciliation they offered to accept ½d. per hour reduction, or to go to arbitration on the whole question. Further, before the rules lapsed, on the 1st inst., my committee sent a circular to their members suggesting that efficient hands be paid the existing rate."

The Registration of Plumbers.—We are informed that of nineteen journeymen plumbers examined at the last meeting of the examiners, nine candidates passed, and ten failed to satisfy the examiners.

Restoration of Shrewsbury Castle.—The exterior of this historic castle has just been restored, at the cost of the Duke of Cleveland, to whom it now belongs. The castle was founded by Roger Montgomery, who held one of the most important commands at the battle of Hastings, and was created first Earl of Shrewsbury; but the alteration of internal arrangement and external detail renders it impossible to say whether the present building is his work, though the massiveness of the walls and entire absence of buttresses lead to such a supposition; and some jamb and arch stones of the principal doorway, which have been found in a disused staircase, are certainly Early Norman and similar in stone and mode of working to the rest of the present building. One of the towers appears to have been altered *circa* 1200–1250. It is irregular in plan and was partially groined; the central boss, which has been found, being of pure Early English work. The main building was again altered about the time of Edward VI. or Elizabeth, an upper range of very good windows on the south side and the roof being of that period. Next came alterations in windows on the principal floor by Telford, the engineer, when he was constructing the great Holyhead-road, and they may be called good specimens of "Engineer's Gothic" of that period; being in good repair, and somewhat picturesque, they have not been meddled with. The castle was besieged in the Civil Wars of Charles I's time, but was taken by strategy by the rebels, and quietly given up again on the restoration of Charles II., so that no damage was done, and we are no doubt indebted to such peaceful transfers for its escape from the destruction which overtook so many other famous castles. The parapets, probably fifteenth-century work, and the ancient stonework generally, have been thoroughly repaired, the roof entirely re-covered with nearly 20 tons of lead, and the building, which lately looked as if going to ruin, is now safe for another hundred years, and forms a capital residence. The work has been executed by the following tradesmen: Mason's work, Mr. Dodgson, of Northallerton; joiner's and painter's works, Mr. Morris; plumbing, Mr. Evans; glazing, Mr. Davies (the latter three all of Shrewsbury). The work has been done under the superintendence of Mr. J. P. Pritchett, architect, Darlington.

Liverpool Engineering Society. — The usual fortnightly meeting of the above Society was held at the Royal Institution, Colquitt-street, on the 6th instant, the President, Mr. John J. Webster, M.Inst.C.E., being in the chair, when a paper was read by Mr. J. J. Campbell, entitled "Compound Engines for Atlantic Navigation." The author, after alluding to the interest that attaches to the question of the best type of engines for large Atlantic steamers, referred to the remark made by Mr. John, of Barrow, in his paper read at the Liverpool meeting of the Institution of Naval Architects last summer, that the large Atlantic lines had been rather behindhand in not having adopted the most recent types of machinery. Having described the principal types of engine hitherto employed in Atlantic steamers, he then spoke of the large consumption of coal in these vessels as compared with others, proceeded to express his opinions on the chief causes of it, especially insufficient expansion from the engines being too small for their power, and pointed out that the increase in pressure and piston speed adopted of late years had been utilised almost exclusively in obtaining more power in proportion to size, and not in producing economy of fuel. Having indicated some of the defects in existing types of engines, the author exhibited several combined diagrams from the engines of Atlantic and other steamers, and described the various methods in use for combining indicator cards, advocating the system recommended by Mr. Schönheyder at Middleabrough.

Alleged Pollution of the Dee by the Sewage of Wrexham.—At the last meeting of the Wrexham Town Council, a letter was read from Mr. S. Smith (Town Clerk of Chester) stating that in consequence of marked pollution of the river Dee, their inspector had been examining into the cause, and he reported, after examining the Wrexham sewage farm, that the disposal of the sewage on the land was not satisfactory, as, at the time of his visit, a large quantity was delivered into the watercourse, which discoloured it for a considerable distance. The Town Clerk of Wrexham said he had communicated this letter to Colonel Jones, consulting engineer for sewage disposal to the Borough of Wrexham, who replied that sewage was never delivered into the watercourse on their farm. It was naturally a matter of great anxiety to him to dispose of half a million gallons of sewage daily, without contamination of the stream by which all its liquid not evaporated must necessarily join the river Dee, from which the city of Chester was supplied with imperfectly-filtered drinking-water, and it was satisfactory to be able to say that that was the first complaint for many years from a corporation so deeply interested as that of Chester in watching his operations. It was resolved to send a copy of this letter to the Town Clerk of Chester.

The Proposed Birmingham Ship Canal. The Birmingham Town Council, at its meeting on the 5th inst., discussed the question of the proposed ship canal from that town to the Bristol Channel ports, *viâ* Worcester, Gloucester, and Sharpness, on a motion introduced by Ald. White, affirming the desirability of improved water communication between Birmingham and the sea, accepting the proposal which has been set on foot to provide this communication by widening, deepening, and otherwise improving the canal and river connexion between Birmingham and Sharpness, and asking for the appointment of a special committee to consider the subject, and to confer with the Town Council of Gloucester, who have already approved the scheme, and with all persons interested in the matter. A provisional committee of prominent citizens of Birmingham, Worcester, Gloucester, Cardiff, Bristol, and Swansea has at present charge of the scheme. A long and interesting discussion ensued on the motion, and in the result an amendment was approved, affirming the general desirability and necessity of improved water communication between Birmingham and the sea, and appointing a committee to consider the proposed and any other schemes which may be brought forward.

Eyemouth Harbour Extension.—According to the *Scotsman*, the harbour extension at Eyemouth has not proved a boon to the port. A plan showing extended quays and a deepened entrance was submitted and approved by the Board of Trade and the Eyemouth Police Commissioners, and the latter body, being assured that a loan of 25,000*l.* would be sufficient to carry out these works, granted security for this amount to the Loan Board. The 25,000*l.* has been spent in providing additional inner accommodation, but no attempt whatever has been made to deepen the entrance, and the port therefore derives no benefit in the shape of additional facilities for entrance and exit,—the main objects of the works. The result is a great additional burden on the inhabitants without any increased revenue. The income of the harbour for the past year did not meet the payments due on the loan, and the Public Works Loan Commissioners called upon the Police Commissioners to make good the deficiency, by laying on a rate of 1s. 1d. per 1*l.* on the whole rental of the burgh, which is the amount of assessment available for that purpose. The Police Commissioners demurred to this, seeing that the harbour has not been improved in the manner represented. The Loan Board has refused to listen to the Commissioners, and an action has been raised in the Court of Session to enforce payment of the instalments.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....load	9 0 0	14 0 0
Sequoia, U.S. ....foot cube	0 2 3	0 3 0
Ash, Canada ....load	3 0 0	4 10 0
Birch ,, ...	2 0 0	3 10 0
Elm ,, ...	3 10 0	4 10 0
Fir, Dantsic, &c.	1 10 0	4 0 0
Oak ,, ...	2 10 0	4 10 0
Canada	3 0 0	6 0 0
Pine, Canada red	2 0 0	3 10 0
,, yellow	2 5 0	4 0 0
Lath, Dantsic ....fathom	3 0 0	5 0 0
St. Petersburg	4 0 0	5 10 0
Wainscot, Riga ....log	2 15 0	4 0 0
,, Odessa, crown....	2 15 0	3 0 0
Deals, Finland, 2nd and 1st....std.	7 0 0	8 0 0
,, 4th and 3rd	5 10 0	6 10 0
Riga	5 10 0	7 0 0
St. Petersburg, 1st yellow	8 10 0	14 0 0
,, 2nd ,, ...	7 0 0	8 0 0
,, white	6 0 0	9 0 0
Swedish	6 0 0	15 0 0
White Sea	7 0 0	16 10 0
Canada, Pine, 1st	17 0 0	25 0 0
,, ,, 2nd....	11 0 0	16 0 0
,, ,, 3rd, &c....	6 0 0	9 0 0
,, Spruce, 1st	8 0 0	10 0 0
,, ,, 3rd and 2nd	5 0 0	7 0 0

TIMBER (*continued*).	£. s. d.	£. s. d.
Deals—New Brunswick, &c.	5 0 0	7 0 0
Battens, all kinds	4 0 0	11 0 0
Flooring Boards, sq. 1 in., prepared, First	0 8 0	0 11 6
Second	0 6 8	0 7 6
Other qualities	0 5 0	0 6 0
Cedar, Cuba ....foot	0 0 3	0 0 3½
Honduras, &c.	0 0 2½	0 0 3½
Australian	0 0 2	0 0 3
Mahogany, Cuba	0 0 4	0 0 7
St. Domingo, cargo average	0 0 4	0 0 6
Mahogany, Mexican, cargo av.	0 0 3½	0 0 4½
Tobasco ,, ...	0 0 4	0 0 6
Honduras ,, ...	0 0 4	0 0 6
Maple, Bird's-eye	0 0 6	0 0 8
Rose, Rio ....ton	7 0 0	10 0 0
Bahia....	6 0 0	10 0 0
Box, Turkey ....ton	5 0 0	15 0 0
Satin, St. Domingo ....foot	0 0 5	0 0 10
Porto Rico	0 0 6	0 0 10
Walnut, Italian	0 0 4	0 0 5

METALS.		
IRON—Bar, Welsh, in London...ton	4 7 6	4 15 0
,, ,, in Wales	4 2 6	4 7 6
,, Staffordshire, London	5 10 0	6 0 0
Sheets, single, in London	6 15 0	8 10 0
Hoops ,, ...	6 0 0	7 0 0
Nail-rods ,, ...	5 15 0	6 10 0
COPPER—		
British, cake and ingot ....ton	43 0 0	43 10 0
Best selected	44 0 0	45 0 0
Sheets, strong....	50 10 0	51 0 0
Chili, bars	39 10 0	39 17 6
YELLOW METAL ....lb.	0 0 4½	0 0 4¾
LEAD—		
Pig, Spanish ....ton	12 10 0	0 0 0
English, common brands....	12 15 0	0 0 0
Sheet, English	13 15 0	14 0 0
SPELTER—		
Silesian, special ....ton	14 2 6	0 0 0
Ordinary brands....	14 0 0	0 0 0
TIN—		
Straits....ton	101 5 0	101 15 0
Australian	101 17 6	102 7 6
English ingots	106 10 0	0 0 0

OILS.		
Linseed ....ton	20 0 0	20 5 0
Cocoanut, Cochin	32 0 0	36 0 0
Ceylon	25 10 0	0 0 0
Palm, Lagos	22 0 0	0 0 0
Rapeseed, English pale	21 15 0	22 0 0
,, brown	20 5 0	20 10 0
Cottonseed, refined	18 7 6	20 0 0
Tallow and Oleine....	25 0 0	45 0 0
Lubricating, U.S.	5 0 0	6 10 0
,, refined....	5 0 0	12 0 0
TURPENTINE—		
American, in casks ....cwt.	1 8 6	0 0 0
TAR—		
Stockholm ....barrel	0 15 0	0 15 6
Archangel	0 12 6	0 0 0

TENDERS.

ALTON (Hants).—For additions and alterations to mansion, Broxhead, Alton. Mr. H. T. Keates, architect, Petersfield:—
J. H. & E. Dyer, Alton (accepted).. £1,851 10 0

ALTON (Hants).—For alterations to stables, Broxhead, Alton. Mr. H. T. Keates, architect, Petersfield:—
J. H. & E. Dyer, Alton (accepted) ... £374 10 0

ASHFORD (Middlesex).—For the erection of villa residence. Mr. Ralph Fitt, architect, Staines. No quantities:—

Bone, Staines	£785 0 0
Hardy, Uxbridge....	745 0 0
Reavell, Staines	735 0 0
Norris, Sunningdale	690 0 0
Henley & Co., London	598 0 0
Addis, Hounslow	591 0 0
Aylott & Bretton, London....	560 0 0

BEDFORD.—For new provident dispensary. Messrs. Usher & Anthony, architects:—

Corby & Son	£1,754 0 0
Haynes & Son	1,750 0 0
W. Freshwater....	1,745 0 0
T. Spencer....	1,715 0 0
Warton & Walker	1,698 0 0
S. Foster....	1,671 0 0
J. P. White (accepted)	1,626 0 0

[All of Bedford.]

BOURNEMOUTH.—For making roads and laying sewers on the Boscombe Park Estate, for the Boscombe Conservative Land Society (Limited). Mr. Reginald G. Pinder, surveyor:—

S. Saunders, London	£903 11 6
S. Minty, Bournemouth	870 0 0
G. James, Bournemouth	715 0 0
W. H. Saunders & Co., Bournemouth	703 18 4
G. Troke, Bournemouth	695 0 0
W. Hoare, Bournemouth	693 0 0
C. Stickland, Bournemouth (accepted)	665 6 10

BOURNEMOUTH.—For new club-room at the South-Western Hotel, for Messrs. Eldridge, Pope, & Co. Messrs. Kemp-Welch & Pinder, architects:—

F. Walden	£399 0 0
Hards	389 0 0
Stroud....	380 0 0
Morse	350 0 0
Rolls	332 0 0

[All of Bournemouth.]

BRIERLEY HILL.—For new bank buildings, for the Birmingham Banking Company (Limited). Mr. J. T. Meredith, architect, Kidderminster. Quantities by Mr. W. Lunn, Portsmouth:—
Wm. Willetts, Old Hill (accepted)... £2,706 10 0
[Exclusive of bank fittings.]

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Town-hall, &c., Demerara (B. Guiana)	E. A. Gruning, Esq.	50*l.* and 15*l.*	June 1st	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Erection of Public Baths	Brighton Town Council	P. C. Lockwood	April 19th	ii.
Railway Stores	L. B. & S. C. Ry. Co.	*Official*	April 21st	ii.
Additions, &c., to "Brookleigh," Esher	J. P. Robinson, Esq.	R. T. Elsam	April 25th	ii.
Road-making and Paving Works	Willesden Local Board	O. Claude Robson	April 26th	ix.
Making-up and Paving Roads	Wandsworth Bd. of Wks	*Official*	do.	ix.
Glazed Stoneware Pipe-Sewers, &c.	Barking Town Local Bd	C. J. Dawson	April 27th	ix.
Gas Holder Tank and Works in Connexion	Mountain Ash Local Bd.	G. W. Stevenson & Son	do.	ii.
Paving Footways and Making-up Roads	Greenwich Bd. of Wks.	*Official*	do.	ix.
Brick and Masons' Work, Wood Green	.....	.....	April 28th	ix.
Construction of Aqueduct	Manchester Corporation	G. H. Hill	April 30th	ii.
Public Baths, St. John's, Hampstead	The Commissioners	Spalding & Auld	May 2nd	ii.
Wrought and Cast Ironwork for Market	Huddersfield Cor.	R. S. Dugdale	do.	ii.
Erection of Schools, Hornchurch	St. Leonard, Shoreditch	F. J. Smith	May 4th	ix.
Extension of Retort House	Rochester, &c., Gas Light Co.	*Official*	May 5th	ix.
Re-covering School with Corrugated Iron	Aberdare School Board	do.	May 12th	ix.
Enlargement and Alterations to Schools, &c.	Schl. Board for London	do.	Not stated	ix.
Works, Repairs, and Supply of Materials	War Department	do.	do.	ii.
Erection of a Malthouse, Malmesbury	.....	Crickmay & Son	do.	i.
New Grammar Schools, Guisborough	The Governors	A. Waterhouse	do.	ix.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
City Surveyor	York Corporation	350*l.*	April 28th	xvi.

CARDIFF.—For erecting new art gallery and lodge, Penarth, near Cardiff, for Mr. J. P. Thompson. Messrs. Seward & Thomas, architects, Cardiff:—

	A*	B†
D. G. Price, Penarth	£2,300 0 0	£320 0 0
L. Purnell, Cardiff	2,275 0 0	320 0 0
R. Wilkins & Son, Bristol	2,200 0 0	250 0 0
D. J. Davies, Cardiff	2,160 0 0	367 0 0
Thos. Evans, Cardiff	2,150 0 0	350 0 0
Luen & Hawkins, Penarth	2,043 0 0	264 14 0
Turner & Sons, Cardiff	1,994 15 0	174 0 0
C. Shepherd & Son, Cardiff.	1,967 0 0	188 0 0
C. Burton, Cardiff ‡	1,878 0 0	258 0 0
D. Davies, Cardiff	1,902 0 0	in Bath stone.
Jones Bros., Cardiff	1,712 0 0	do.

* Including red Shawk stone.
† Deduction if Box-ground Bath stone is substituted.
‡ Accepted.

CHISWICK.—For the supply of 1,000 yards cube of 2-in. broken Guernsey granite, for the Chiswick Local Board:—

	s.	d.	
Mowlem & Co.	11	11	per cube yard.
Turner & Son	11	8	,,
Manuelle	11	1	,,
Runnels	11	0	,,
Fennings	11	0	,,
Nowell & Robson	10	11	,,
Griffiths (accepted)	10	3	,,

CRICKLEWOOD.—For the drainage of Hill Side, Cricklewood, for Mr. John Parris. Mr. Chas. J. Gladman, architect:—

Tennant	£255 17 0
J. Vears & Co.	199 0 0
Wm. Neave & Son (accepted)	179 0 0

CROYDON.—For the erection of additional stabling in Handcroft-road, for Messrs. Carter, Paterson, & Co., under the superintendence of Mr. William Eve, architect, Union-court:—

Johnson	£1,287 0 0
Holland	1,273 0 0
Brass & Son	1,232 0 0
Downs	1,220 0 0
Harris & Wardrop	1,212 0 0
Higgs	1,170 0 0
Page, Borough-Hill, Epsom-road, Croydon (accepted)	1,055 0 0

DUDLEY.—For erecting warehouse for Messrs. Grainger & Smith. Mr. J. T. Meredith, architect, Kidderminster. Quantities by Mr. W. Lunn, Portsmouth:—

Webb & Round, Dudley (accepted)	£488 0 0

FELIXSTOWE (Suffolk).—For residence at Felixstowe. Mr. Horace Cheston, architect, London. No quantities:—

F. Bennett, Ipswich	£2,375 0 0
Ward, Felixstowe (accepted)	2,250 0 0

FOREST HILL.—For rebuilding offices and shops at Devonshire-road, Forest Hill, for Mr. Julius Garner. Mr. Frederic J. Ward, architect, Bucklersbury:—

Higgs	£2,470 0 0
Bootle	2,400 0 0
Grice	2,270 0 0
Ball & White	2,180 0 0
Chalcroft, Tottenham (accepted)	2,000 0 0

GUILDFORD.—For alterations to 36, High-street. Mr. J. W. Stevens, architect and surveyor, New Bridge-street:—

May	£148 0 0
Garnett	144 0 0
Burdett & Son (accepted)	137 19 0

GRAYS THURROCK (Essex). — For new schools, Arthur-street, for the Grays Thurrock School Board. Mr. Geo. Waymouth, architect. Quantities by Messrs. Goodchild & Son:—

Howell & Son	£7,973 0 0
W. Watson	7,950 0 0
F. & H. F. Higgs	7,870 0 0
Balaam Bros.	7,300 0 0
W. & J. Croaker	7,184 0 0
H. J. Carter	6,800 0 0
Allen & Son	6,650 0 0
G. Stevenson	6,174 0 0
S. Grist	5,718 0 0

HANWELL (Middlesex).—For oak fencing to be fixed at the Cuckoo Schools, Hanwell, Middlesex:—

Brown	£581 10 0 !
Nye	243 0 0
Michiner	231 0 0
Montgomery	225 10 6
Hawton	214 0 0
Geary	208 11 0
Limmon	201 18 0
Ridley	200 12 6
Stenning	198 0 0
Taylor & Brooker	195 0 0
Watkins	192 0 0
Marshall	187 5 0
Rowland	186 13 10
White	185 0 0
Gardam	183 15 0
Child	179 0 0
Agate	169 8 0
Box	164 19 2
Osborne, Stevens, & Co., Uxbridge *	163 9 6 !

* Accepted.

HOXTON.—For rebuilding furniture warehouse, 56A, Hoxton-street, for Mr. James Robinson. Mr. J. W. Stevens, architect, New Bridge-street. Quantities supplied:—

Higgs & Hill	£1,540 0 0
Ashby Bros.	1,387 0 0
White & Co.	1,378 0 0
Holliday & Greenwood	1,377 0 0
Hoare & Co.	1,336 0 0
Smith & Son	1,327 0 0
Woodward	1,236 0 0
Prestige & Co.	1,183 0 0
Peppiatt	1,059 0 0

IPSWICH.—For the Victoria Free Library, adjoining the Museum, for the Committee of the Jubilee Fund. Mr. Horace Cheston, architect, London. No quantities:—

A. Coe	£898 10 0
W. Grayston	857 10 0
F. Bennett (accepted)	837 10 0

KENNINGTON.—For Mission Church and parish-room at Kennington Cross, for the Rev. G. H. Bromfield. Mr. J. Ll. Wilson, architect. Quantities by Mr. Alfred J. Beesley:—

Ashby Bros.	£3,045 0 0
Clemence	2,995 0 0
Williams	2,990 0 0
A. White & Co.	2,819 0 0
Holloway	2,749 0 0
Heath	2,628 0 0
Puzey & Lumley	2,625 0 0

KINGSLAND.—For additions to the premises, 110, High-street, Kingsland. Mr. R. A. Lewcock, architect, Bishopsgate-street:—

Erton & Burton	£281 0 0
S. Goodall	259 0 0
S. Hayworth & Sons	244 0 0
J. Ivory	186 10 0

LONDON.—For rebuilding 1, 2, and 3, Newman-street, Oxford-street, for Mr. S. Chick. Mr. Edward C. Robins, F.S.A., architect:—

Stephens & Bastow	£8,373 0 0
Bywaters	8,359 0 0
Wall Bros.	8,246 0 0
Scrivener	8,163 0 0
Lawrence & Sons	8,091 0 0
Pusey & Lumley	8,075 0 0
Charteris	7,982 0 0
Manley (accepted)	7,934 0 0

LONDON.—For the erection of St. Saviour's Church, Hanley-road. Messrs. J. E. K. & J. P. Cutts, architects:—

Jas. Holloway	£5,710 0 0
Lathey Bros.	5,630 0 0
Dove Bros.	5,575 0 0
J. Tyerman	5,500 0 0

LONDON.—For works at 74, Bishop's-road, Cambridge Heath. Mr. R. A. Lewcock, architect, Bishopsgate-street:—

C. Batchelder	£217 0 0
S. Goodall	195 0 0
J. Ivory	179 10 0

LONDON.—For decorations and repairs at the Offord Arms, Caledonian-road. Mr. R. A. Lewcock, architect, Bishopsgate-street:—

J. Walker	£436 0 0
Burch	329 10 0
Ivory	315 0 0
Spencer & Co.	310 0 0
S. Goodall	286 15 0

LONDON.—For alterations at the Prince of Wales tavern, Harrow-road, Paddington. Mr. R. A. Lewcock, architect, Bishopsgate street:—

Ivory	£1,795 0 0
Mark	1,776 0 0
Steel Bros.	1,750 0 0
S. Goodall	1,690 0 0
J. Anley	1,548 0 0
Handover	1,520 0 0
Jackson & Todd	1,490 0 0
Burch	1,435 0 0
J. Walker	1,390 0 0
Spencer & Co.	1,370 0 0

LONDON.—For completion of sundry fittings at 44, Fish-street-hill, for Messrs. Wilkinson & Son. Mr. J. W. Stevens, architect and surveyor, New Bridge-street:—

A. White & Co.	£135 0 0
Fuller, Walthamstow	129 0 0
Lamprell (accepted)	119 0 0

LONDON.—For restoring premises damaged by fire, 346, Mile End-road. Mr. C. A. Legg, architect and surveyor:—

Hearle & Son	£639 0 0
F. & F. J. Wood	535 0 0
Calnan	525 0 0
Hawkins	498 0 0
Wyard	467 0 0
A. Nicholls (accepted)	410 0 0
Coulsell Bros. (too late)	375 0 0

LONDON.—For the erection of warehouse in Blossom-street, Shoreditch, for Messrs Nicholls & Clarke, under the superintendence of Mr. William Eve, architect, Union-court:—

Boyce	£2,872 0 0
Morter	2,847 0 0
Holliday & Greenwood	2,844 0 0
Conder	2,828 0 0
Cox, Ash-grove, Hackney *	2,695 0 0

* Accepted.

LONDON.—For rebuilding 380, Bethnal Green-road, for Mr. W. Unwin. Messrs. Thos. & Wm. Stone, architects, Great Winchester-street:—

W. Gregar	£1,087 0 0
Godfrey & Son	980 0 0
B. Wire	960 0 0
J. W. Dixon & Co.	957 0 0
Steel Bros.	940 0 0
R. Edwards	875 0 0
F. G. Higgs	826 0 0
G. W. Beale (accepted)	823 0 0

LONDON.—For the erection of club buildings and flats, for the Bryanston Club, Lisson-grove. Mr. Geo. Hubbard, architect, Finsbury-circus. Quantities by Mr. J. Sargeant, Holden-terrace:—

A. & E. Braid *	£3,978 0 0

* Accepted under schedule of prices.

PETERSFIELD.—For sanitary re-arrangements at the Board Schools. Mr. H. T. Keates, architect:—

H. Woods, Petersfield (accepted)	£158 0 0
A. Patrick, Petersfield	152 0 0

PLYMOUTH.—For taking down and re-erecting four shops and dwelling-houses, with one bakery, situated 7, 8, 9, and 10, Exeter-street, Plymouth. Mr. B. H. Pethick, architect:—

T. Reed	£2,490 0 0
Tover & Son	2,229 0 0
A. R. Lethbridge	2,190 0 0
T. Horley	2,110 0 0
G. Shillabear	1,950 0 0
Palk & Partridge	1,890 0 0
Lapthorn & Goad (accepted)	1,875 0 0

[All of Plymouth.]

SLOUGH.—For proposed new laundry and new pianoroom at the British Orphan Asylum, Slough. Messrs. Edginton & Summerbell, architects, Windsor. Quantities by the architects:—

	New Laundry.	Pianoroom.
Snell & Co.	£1,28[illegible]	£502
J. Willis	1,2[illegible]4	449
W. Reavell	1,144	489
J. Deverill	1,[illegible]80	500
Woodbridge	1,112	448
Bradney & Co.	1,095	480
Turtle & Appleton	1,085	447
W. Watson	1,[illegible]28	432
T. Martin *	1,010	419

* Accepted subject to revision.

SOUTHWARK.—For alterations and repairs at the Angel public-house, Newcomen-street, Southwark, for Mr. C. Hoare. Mr. Arthur W. Saville, architect, Strand. Quantities supplied:—

Ward & Lamble	£840 0 0
Treweeke	837 10 0
Nye	733 0 0
Anley	710 0 0
Walker	694 0 0
Lawrence	679 0 0
Royal	616 0 0
Spencer & Co.	615 0 0
Perterer's Work.	
T. Heath	£93 0 0
T. Moody	77 0 0
W. Helling	58 0 0
G. F. Moody	52 9 0

STROUD GREEN.—For building the Stroud Green High School for Girls, and residence attached, Oakfield-road, for Miss Emily Mills. Mr. W. Street Wilson, architect. Quantities by Mr. J. W. Stevens, New Bridge-street:—

Lansdown & Co., Richmond (accepted) £2,125 0 0

UXBRIDGE.—For erecting a new residence at Denham Fishery, near Uxbridge, for General Goodlake, V.C. Mr. Chas. J. Bentley, architect, Union-court, Old Broad-street:—

Chappell, Pimlico	£10,333 0 0
Nightingale, Lambeth	10,165 0 0
Bull & Son, Southampton	9,896 0 0
Bird, Upper George-street	9,835 0 0
Turtle & Appleton, Wandsworth	9,760 0 0
Brown & Sons, Harefield	9,650 0 0
Parnell & Son, Rugby	9,639 0 0
Marriage, Croydon	9,600 0 0
Barnes, Ilford	9,595 0 0
Barnsley & Sons, Birmingham	9,466 0 0
Horsley Bros., Birmingham	9,460 0 0
Kearley, Uxbridge	9,170 0 0
Hendy, Uxbridge	8,886 10 0
Fassnidge & Son, Uxbridge*	8,881 0 0

* Accepted.

UXBRIDGE.—For erecting a gamekeeper's lodge, pair of labourers' cottages, and a range of garden buildings at Denham Fishery, near Uxbridge, Middlesex, for General Goodlake, V.C. Mr. Chas. J. Bentley, architect:—

	Lodge.	Cottages.	Greenhouses.	Total.
	£. s. d	£. s. d.	£. s. d.	£. s. d.
Bird	466 0 0	765 0 0	999 0 0	2,230 0 0
Turtle & Appleton	475 0 0	792 0 0	920 0 0	2,187 0 0
Hunt	486 0 0	798 0 0	875 0 0	2,159 0 0
Brown, Son, & Blomfield	470 0 0	720 0 0	950 0 0	2,140 0 0
Marriage	465 0 0	785 0 0	868 0 0	2,118 0 0
Adamson & Son	459 0 0	754 0 0	897 0 0	2,110 0 0
Hendy	430 6 10	661 11 6	857 9 6	1,949 7 10
Fassnidge & Son	416 0 0	656 0 0	796 0 0	1,868 0 0
Kearley	379 0 0	627 0 0	759 0 0	1,765 0 0
Brown & Sons, Harefield (accepted)	345 0 0	549 0 0	750 0 0	1,644 0 0

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